CARLO GAVAZZI
Automation Components

CARLO GAVAZZI

Solutions for Energy Management

- Multifunction Meters
- Power and Quality Analyzers
- Transducers
- Energy and Utility Meters
- Software
- Accessories

Control

What is and Why use the Energy Management Components

Green levies, tighter operating margins and profits are a few economic drivers forcing operators to use more intelligent power management strategies.

Real-time measurements of electrical parameters, such as voltage variations or distortions, can be transmitted via networks to operators, warning of breaches in threshold limits. And, the power quality information improves on-site efficiency and eases negotiation with utility companies and energy authorities.

For starters, several utility meters or power analysers should be located at the service entrance and at strategic points throughout the site. Data can be transmitted to a host PC over a serial link. Meanwhile, an energy management software improves real-time data from several networked nodes so to work out a power profile.

Large commercial or industrial electricity consumers have to deal with fixed energy charges related to the power demand of one or more sites as well as the charge per unit of energy consumed. If the business exceeds the agreed power demand or "installed power" then it is forced to pay extra costs. To matters worse, utilities can also impose higher installed power tariffs that can often represent up to 60% of a commercial consumer's total utility charge. So clearly, a small mistake that leads to a brief excess power demand can cost many thousands of euro.

Carlo Gavazzi supplies EM systems that provide information so that operators can identify consumption trends and take corrective actions. Analysing the power profile operators can also aggregate loads and so negotiate more favourable terms with the utility company. Real time power consumption monitoring also allows a site manager to anticipate overloads conditions that would, for example, trip a circuit breaker.

Alarm thresholds can be set to warn managers if preset limits are reached, and armed with the adequate system loading and status information having time to organise remedial actions.

Why different buses and solutions

- ***RS422-RS485 communication in a local network:*** *all the measurements made by single instruments can be gathered through a standard Modbus to a PLC or a PC in order to carry out specific variable analysis and control (Wattsoft).*

- ***Modem / RS232 communication:*** *if the measuring devices are spread in a wide area or in different countries with the need to collect the local data for centralised analysis, the right answer is WM4 or PQT90 with external modem together with Wm4Soft or PqtSoft software.*

- ***Wireless communication:*** *if the high distances or specific applications are not allowing to use ordinary wired systems, the solution is called PqtKit with PqtSoft. A GSM / GPRS communication kit with a proper powerful network data download software.*

- ***Ethernet and Internet communication:*** *if it is needed to measure the variables exploiting the existing LAN, the solution is WM4 or PQT90 with AR1060 plug-in module. It easily displays the variables, the consumptions and the trends in any enabled PC of the LAN. Moreover, using the WEB server capability of AR1060, the same data can be shown outside the company.*

- ***Dupline communication:*** *if the load consumptions and alarms have to be monitored together with a powerful building automation system, the unique solution is called Carlo Gavazzi Dupline installation bus. Everything under control using only one bus system.*

Energy Management and Dupline Field Bus . . . making energy metering easy in very noisy plants

When an idea becomes a great idea …

The introduction of the Climate Change Levy is affecting consumers of energy in one way or another. The basic outcome is that users who are inefficient in their use of energy will pay more than efficient users. There are several ways to avoid or reduce the extra costs of the CCL but most of them involve some major investments in plants or new technologies such as CHP, wind power or other renewable energy sources. The easiest way to offset these extra costs is to control your consumption of energy.

The fundamental questions you have to ask in order to find a solution to save energy and money

- How much energy is consumed?
- Is there any energy waste?

… and the answers?

- Find an easy way to measure it
- For sure, there are loads that are running even if it is not necessary. For instance, lights and extractor fans when the building is empty. Therefore a smart system to turn the loads ON and OFF is needed.

Dupline®
Fieldbus Installationbus

The unlimited efficient solution possibilities provided by the Dupline Field Bus

- Light control, switching ON/OFF and dimming lights;
- Temperature control, detecting signals from infrared remote controls or PIR sensors and acting on heating elements and/or valves;
- Ventilation control, measure of room and outdoor temperature;
- Monitoring of doors, locks and windows;
- Monitoring of fire alarms from smoke detectors;
- Water leakage detection using proper sensors;
- And many others …

Main application advantages

- Free topology for a fast, flexible and easy to build step-by-step installation; the system can be easily adapted to new unexpected requirements.
- User friendly: easy to code addresses and test, easily accessible data from a PC/PLC.
- High electrical noise immunity, no shielded cables are needed therefore existing cable/conduit/pipe can be exploited.
- Data communication up to 10 km, no signal repeaters are needed.
- Integration of the metering system with the Dupline door-light-intrusion-remote controls and load switching.
- Cost-effective solution when compared with the ordinary systems.

Energy Management

The other Fieldbus compatible instruments:

DIN-rail mounting:
EM1-WM1-SPT-PQT
Flush mounting:
WM2-WM3-
WM24-WM4.

The main Bus devices

Individual counter

G 4420 74014 inputs for: 4*kWh meters;
2*kWh + 2*kvarh meters. Reset feature.
Data retention in case of power failure.

Master channel generator

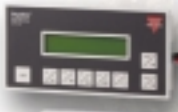
G 3890 0014 G 3800 0015 Power supply:
115V, 230VAC or 10 to 30VDC

The data acquisition system

The Dupline DDE Server to acquire the information of the Energy meters through the Dupline field Bus system.

Displays and accessories

LCD text display, LED display,
coding units, repeater.



Bus-Powered Sensors

Inductive-magnetic proximity switches,
PIR-sensors, temperature sensors.

Analogue I/O Modules

1or 4*20mA/10VDC inputs,
1or 4*20mA/10VDC outputs.

Digital I/O Modules

1 to 8 contact inputs, 1 to 8
outputs, combined I/O modules.

Gateways and Interfaces

Profibus-DP, Devicenet, LonWork,
Interbus-S, ModBus.
PLC direct interfaces, Modem.

The Energy Management components for . . .

Commercial Buildings: Shopping Centres, Resorts, Supermarkets, Restaurants

Services and Infrastructures: Schools, Hospitals, Stadiums

Lighting Heating Conditioning Alarms Billing

Commercial Buildings

In many commercial buildings as a matter of fact the need to control and measure the energy consumption by single user is becoming more and more important because of the need to save money or issue the energy bill when needed.
Since the criterion is “the higher the energy consumption the lower the price” instead of having a supply contract for every shop / owner with a low consumption (higher energy cost), there is only one contract with high consumption (lower energy cost) whose sub-metering can be easily carried out using our energy meters and power analysers.
Moreover the intelligent installationsbus Dupline can be common to our energy metering system and our Building Automation system. It allows, using proper Dupline sensors (temperature, light) and I / O modules, to manage the lighting system as well as the heating and air conditioning system so to achieve further energy cost savings.
In the services and infrastructures, in addition to the building automation system already mentioned above, there is also the need to have a full electrical parameters control. In those places the reliability of power supply and therefore the safety conditions are of vital importance. Dupline can be exploited to gather and manage the alarms coming from our power analysers so to notify abnormal conditions in order to let the maintenance personnel act in a due time.

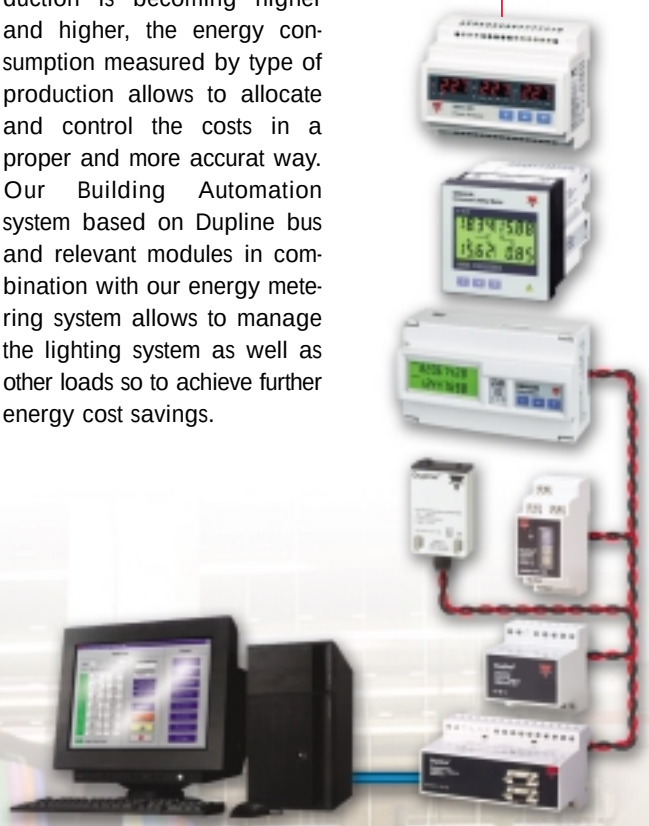
Services and Infrastructures

Production Facilities: Cost Allocation

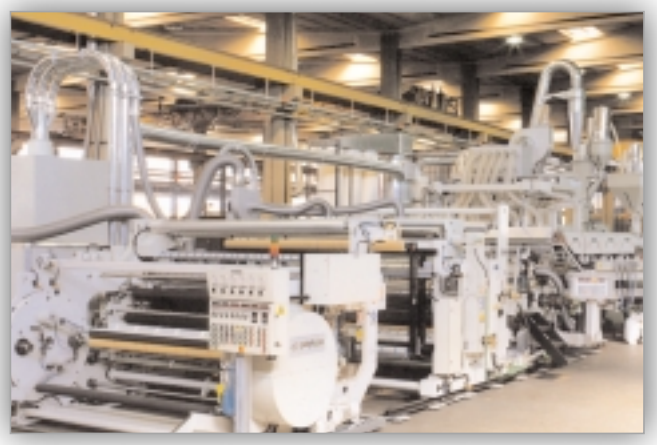
Lighting Heating Ventilation Cost

Since the cost pressure on production is becoming higher and higher, the energy consumption measured by type of production allows to allocate and control the costs in a proper and more accurat way. Our Building Automation system based on Dupline bus and relevant modules in combination with our energy metering system allows to manage the lighting system as well as other loads so to achieve further energy cost savings.

Production Facility



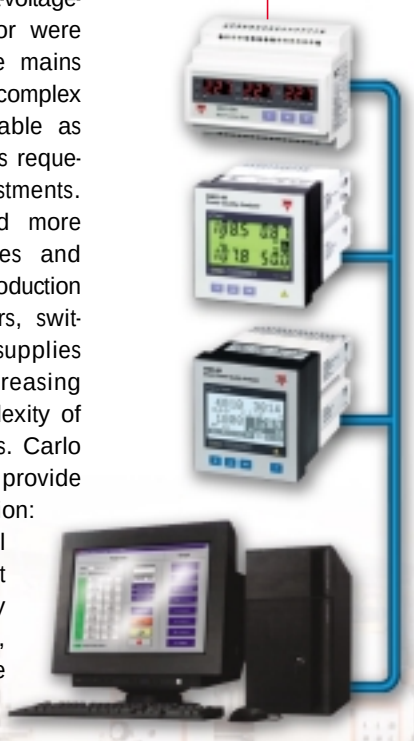
Light and Medium Industry: Loads Control



In the past just simple measuring systems like current-voltage-power and power factor were available to keep the mains under control. More complex solutions were available as well but in many cases requested higher investments. Nowadays more and more sophisticated machines and loads are used in the production facilities like computers, switching-mode power supplies and drives thus increasing significantly the complexity of loads and of problems. Carlo Gavazzi is capable to provide different levels of solution:

- WM12, a powerful and compact unit replacing the ordinary set of three ammeters, one voltmeter and one rotary-switch;
- a more advanced system which includes in addition to the power analysers also a powerful supervision software with the aim to build-up an installation and load history so to prevent with a planned maintenance scheme load failures and production stops.

Light and Medium Industry



The Energy Management components for . . .

Big and Heavy Industry: Steel, Shipyards, Mines, Wood, Car

Transports: Airports

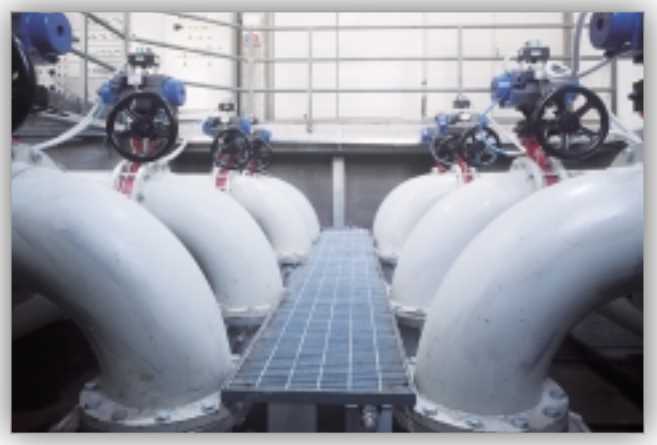
Lighting *Heating* *Ventilation* *Alarms*

In the big and heavy industry as well as in the airports it is of fundamental importance to have a powerful control of the mains since medium voltage systems and very high currents are involved. Because of the type of loads, a low content of harmonics is crucial to let the installation work in a proper and reliable way. Stops of productions are not allowed at all because they will significantly impact in the finance of the company or service. Two levels of solutions can be provided:

- power analysers with integrated harmonics analysis and a supervision software with the aim to build-up an installation and load history so to prevent with planned maintenance load failures and production stops;
- our intelligent installationsbus Dupline that, using proper sensors (temperature, light) and I/O modules, can manage the lighting system as well as the heating and air conditioning system so to achieve energy cost savings. The same bus is also used to gather and manage alarms coming from our power analysers so to notify abnormal conditions and react in a proper way.

Big and Heavy Industry / Transports

Water: Potable Water Plants, Water Distribution Plants



Pump *Level* *Flow* *Alarms*

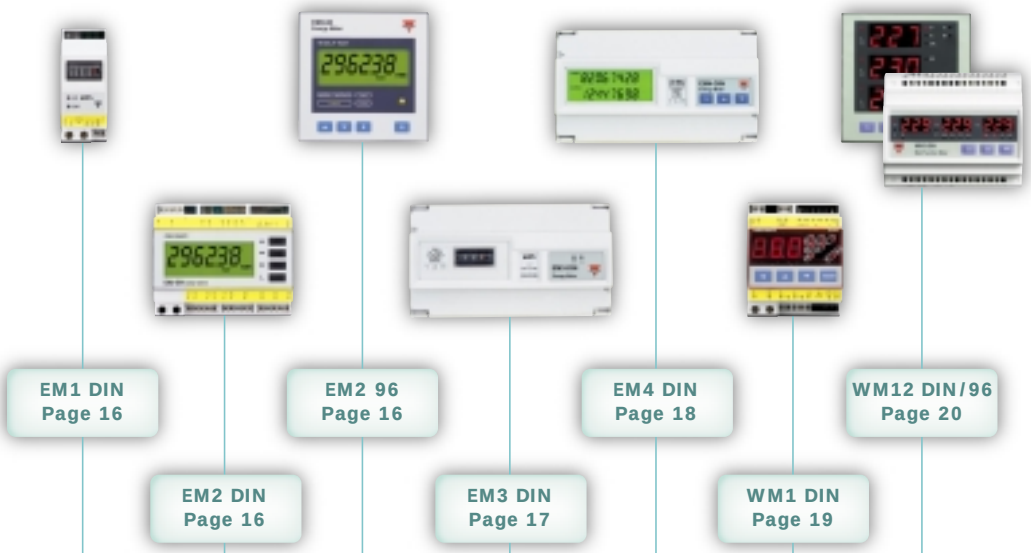
A water treatment and distribution system is, because of dimensions of plants, distances among the various pumping stations and parameters to be involved, very hard to manage. The Carlo Gavazzi Dupline installationsbus with its up to 10 km transmission distance, its free topology and the variety of analogue and digital I/O modules is capable to gather all the level, flow and alarm signals and the pumps start and stop in order to manage the whole system in a reliable and cost effective way. Last but not least, the monitoring of mains and working of pumps with local power analysers and fully integrated data logging system is crucial to grant a continuous load control that with GSM modem and SMS transmission capability, alerts service staff on their mobile phones as soon as an abnormal condition occurs.

Water treatment and Distribution

Telecom: Telecommunications

Everybody knows how important the mobile telecommunication is nowadays and will be even more in the future.
The relevant antennas are installed in the field and have to grant the communication without problems.
Since field telecommunication systems are not attended at all, it is needed to provide to the mobile phone company information related to the voltage, current, power and in some cases also energy consumptions.
Carlo Gavazzi is able, with different level of instrument complexity, to provide the requested electrical parameters using, according to the installation needs, compact or modular power analysers.

Telecom



Energy meter	●	●	●	●	●		
Power Analyzer						●	
Multi Function Meter							●
Power Quality Analyzer							
Universal Utility Meter							
Transducer							
Power Quality Transducer							
Modular			●	●	●		
Graphic Display							
Digital Inputs					●	●	
Pulse outputs	●			●	●	●	
Analogue Outputs							
Alarm Outputs					●	●	
Serial Communication					●	●	●
Internet-Ethernet Communication							
GSM/SMS Management							
Energy	●	●	●	●	●	●	
Gas and H_2O Metering					●		
Instantaneous Variables						●	●

WM14 DIN/96
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WM2 DIN
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WM2 96
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WM22 DIN
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WM3 96
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WM4 96
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SPT 90
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PQT 90
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CVT DIN
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The Product Advantages

EM1 DIN
- Direct connection up to 22.5 A, no CT is needed
- TRMS measurement
- Self power supply, easy connection

EM2 DIN, EM2 DIN
- Large display
- Compact housing, only 107mm wide
- User friendly

EM3 DIN, EM4 DIN, WM22 DIN
- Plug and play modules
- Maximum in-field flexibility
- Possibility to add any outputs only when really needed by the application

WM1 DIN
- Compact Power Analyzer

WM12 DIN, WM12 96, WM14 DIN, WM14 96
- Replacement of ordinary "DPMs and analogue instrumentation combined by rotary switches"
- Status of system power supply and neutral current available at a glance
- 96x96 version with only 46 mm housing behind panel, suitable for all switch and control gears

EM2 96, WM2 96,
- Plug and play modules
- Maximum in-field flexibility
- Possibility to add any outputs only when really needed by the application

WM23 96, WM3 96
- Powerful performances
- Plug and play modules
- Maximum in-field flexibility
- Possibility to add any outputs only when really needed by the application

WM24 96, WM4 96
- Energy, gas and water metering
- Event and data stamping
- Maximum in-field flexibility given by plug and play modules
- Possibility to add any outputs only when really needed by the application

CVT DIN
- Compact Transducer
- Simple measurement of voltage, current and frequency

SPT 90
- Smart power Transducer
- Modularity available for the power supply and for the output modules
- Wide scaling capability
- Combination of analogue and serial outputs

PQT 90
- Harmonic analysis and utility metering
- Event and data stamping
- Maximum in-field flexibility given by plug and play modules
- Possibility to add any outputs only when really needed by the application

PQA700
- Measurement of single phase and system variables
- Complete Harmonic analysis up to the 50th harmonic
- 20ms continuous signal sampling
- Automatic storage of MIN, MAX and AVG values
- Time-based curve distribution of variable and load
- Statistic management of stored variables
- Oscilloscope functions
- Built-in printer

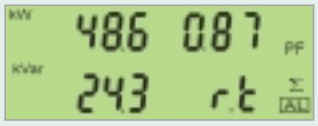
EM3 DIN, EM4 DIN, WM22 DIN

The screw terminals
Connections for cables with cross-section area from 6 to 35mm² instead of passing-by types assuring a "contactor type" wiring and connection protection.

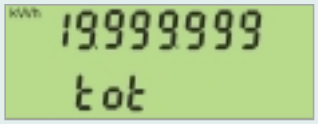
The sealing capability
The new housing concept grants a full sealing capability and connection protection.

WM22 DIN

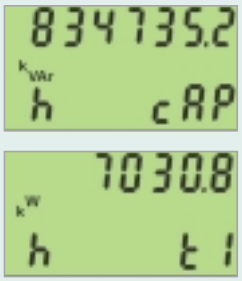
Example of variables displayed with serial communication diagnostics: r.t (Rx/Tx).



Example of 7 1/2 digit energy displaying.



WM24 96



This universal utility meter is able to measure and display the total energies in the four quadrants (+kvar-L, -kvar-L, +kvar-C, -kvar-C). The access to the programming parameters can be locked in order to avoid undesired modifications. Furthermore the measured energies can be managed by time period/tariff: t1-t2-t3-t4 by means of three input contacts. Those contacts can be used, in alternative, as counter inputs to measure m³ of gas and water.

WM23 96

This power quality analyzer is able to show any single current and voltage harmonics and the THD on which it is possible to connect an alarm output.
The wide LCD display with high contrast features is able to show all the measurements and in addition the recording of the MAX active powers: WL1, WL2, WL3, Wsys, Wdmd and the MIN power factors: PF1, PF2, PF3, PFsys.

The two SPT 90 programming systems

RS232 communication port

Programmable key-pad

A new concept of Modularity

In addition to the obvious need to improve the performances of the measuring instruments in order to keep them up-to-date with the state-of-the-art technology, it is more and more important to offer user-friendly instruments being easily and quickly adaptable to the application and management needs of the customers.
These needs have resulted in a new and modern range of instruments which, according to various criteria of signal processing and displaying, can be turned into:

- transducers (only 96 series)
- indicators
- controllers.

Technical Advantages and Cost Benefits

- PLUG and PLAY modules common to all models; Maximum in-field flexibility;
- Possibility to expand the number and the kind of outputs according to new application needs without replacement of the instruments in-field.
- Small number of models in-house, with a high offer of possible combinations at the same time.
- Investments in the instrumentation are only limited to the present needs with the possibility to expand it in the future for any additional requirements.

EM3 DIN

EM3 DIN is an energy meter that has been developed to meet the requirements of those applications where a very simple and reliable instrument is needed.

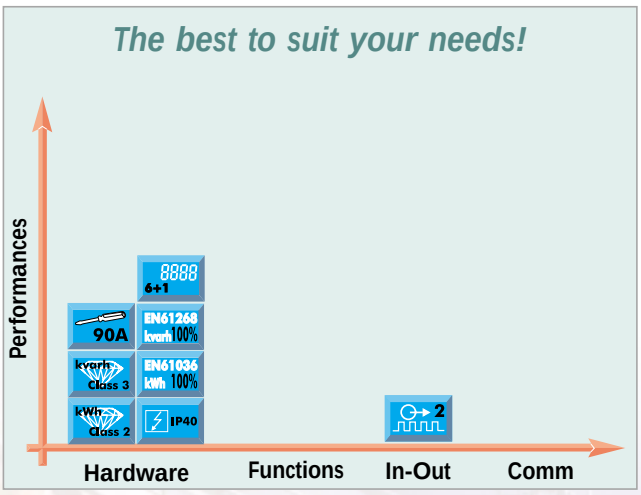
The main advantages

- Electromechanical display allowing the user to read the consumed energy even when the load or the meter is not power supplied.

- Easy installation avoiding any programming set-up.
- Self power supply making the installation easier and more reliable.
- Direct connection up to 90A allowing the user to save the costs of external current transformers and relevant wiring.
- Dual pulse output transmitting to a PLC or other equipment the active and reactive energy simultaneously.
- Wall mounting avoiding any other protection enclosure.
- Measurements in full compliance with both EN61036 (active energy) and EN61268 (reactive energy) granting more reliable and accurate measurements.

Modular Energy Meter EM3 DIN

Housing (H x W)		90x162.5 (9 DIN modules)
Display type		Mechanical
Variables on display		YES
Instantaneous variables		N.A.
Energy variables		6+1 DGT
Accuracy		Class 2 (EN61036) Class 3 (EN61268)
Temperature drift		≤250ppm/°C
Sampling rate		2 samples/s
System type		Unbalanced: 3-phase
Voltage inputs (Un)		120/208VAC, 230/400VAC, 380/660VAC
Current inputs (In)		Ib: 20A, Imax: 90AAC
Digital inputs		N.A.
Primary of CT / VT		N.A.
Measurements:		TRMS method
	Variables	kWh or kvarh (selectable)
Harmonic distortion		N.A.
Outputs:	**Pulse**	2 (open collector type)
	Alarm	N.A.
	Analogue	N.A.
	Serial	N.A.
Digital filter		N.A.
Other characteristics		Start-up current: 80mAAC
Power supply		Self power supply 115VAC, 230VAC
Approvals		CE
Protection degree		IP40



EM4 DIN

EM4 DIN is an advanced utility meter capable to measure not only the usual consumed energies but also gas and water by means of the optional dual contact inputs module.

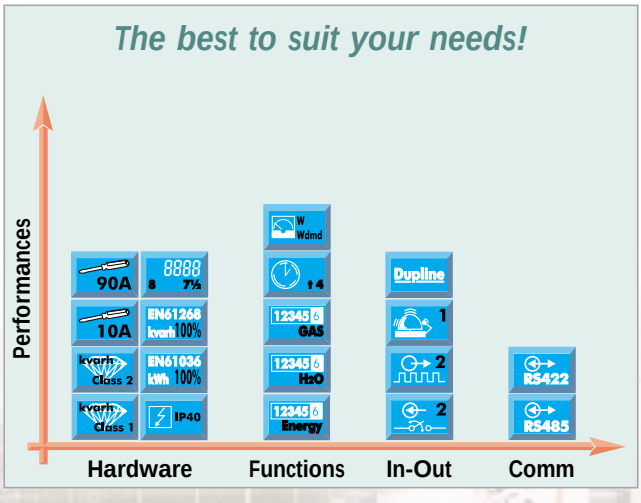
The main advantages

- High accuracy and resolution for a fine cost calculation.
- Simultaneous indication of both active and reactive energy allowing the user to read the variables at a glance.

Energy Meter EM4 DIN

Housing (H x W)		90x162.5 (9 DIN modules)
Display type		LCD (back lighted)
Variables on display		YES
Instantaneous variables		3 1/2 DGT
Energy variables		8 DGT + 7 1/2 DGT
Accuracy		Class 1 (EN61036) Class 2 (EN61268)
Temperature drift		≤200ppm°/C
Sampling rate		2 samples/s
System type		Bal.: 3-phase, Unbal.: 3-phase
Voltage inputs (Un)		57/100V, 120/208VAC, 230/400V, 380/660VAC
Current inputs (In)		In: 5A, Imax: 10AAC Ib: 20A, Imax: 90AAC
Digital inputs		2 indep. (H_2O/gas counter or 4-time period selection)
Primary of CT / VT		Prog: CT up to 5000A; VT up to 20kV
Measurements:		TRMS method
	Variables	Total: kWh, kvarh, H_2O, gas; t1-t2-t3-t4: kWh, kvarh; t1-t2: gas; W_{L1}, W_{L2}, W_{L3}, W_{dmd}
Harmonic distortion		N.A.
Outputs:	**Pulse**	2 (open collector type)
	Alarm	1 (open collector or relay)
	Analogue	N.A.
	Serial	RS422/485 (Modbus)
	Dupline	kWh and kvarh data transmission, water and gas inputs and data transmission
Digital filter		N.A.
Other characteristics		Modular concept, Plug-in modules
Power supply		Self power supply, 24, 48, 115, 230VAC, 18-60 73-143VDC
Approvals		CE
Protection degree		IP40

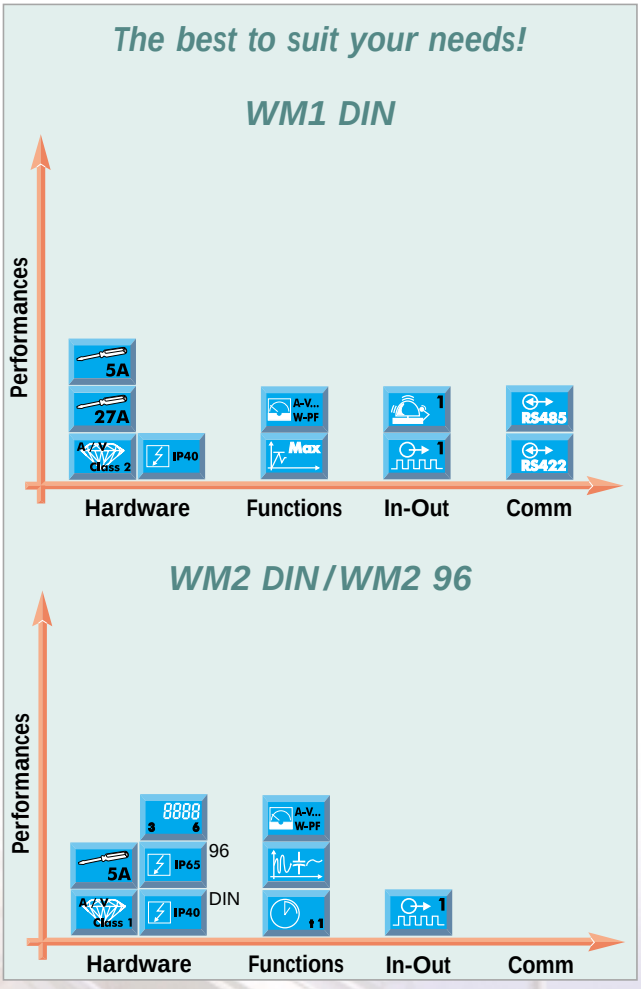
- Displaying of the active power demand with manual or external synchronisation. The fixed power supply costs are calculated with the same system used by the electricity board.
- Management of the pulses from gas and water meters based on single or dual tariff calculation and energy multi-tariff management (by means of two selection contact inputs) giving more flexibility and meeting the application needs.
- Metering of energy, water and gas in the same instrument allowing the data transmission by means of the same communication port. Now available also via Dupline.
- Effective control of phase sequence, serial communication and wrong connection of the current inputs statuts making the instrument installation: easy, fast and free of wiring errors.
- Self power supply working even in case of one phase line failure granting continuous metering of energy.



WM1/WM2 DIN WM2 96

WM1 DIN, WM2 DIN, WM2 96 are general purpose analyzers capable to measure all the electrical parameters of an electrical line or load. Their user friendliness allows it to be mounted in the switch and control gears as local indicators instead of the classical single function instruments. WM1 DIN is suitable for 1-phase and 3-phase balanced load applications where the direct connection up to 27A simplifies the connections and allows to save money since the CT is not needed.
WM2 96 and WM2 DIN can also be used as a remote unit to transmit both the measured energy to a PLC by means of the pulse output.

Energy Meters		WM1 DIN	WM2 DIN/96
Housing (H x W)		89x71.5mm	89x107/96x96mm
Display type	Var. on display	LED YES	LCD bk. lighted YES
Instantaneous variables		3 DGT	3 DGT
Energy variables		3 DGT	6 DGT
Accuracy		V-A: ±2% F.S.	V-A: ±2% F.S.
Temp. drift	Sampling rate	≤250ppm/°C 1	≤200ppm/°C 3
System type		Bal: 1-3-phase	Bal: 1-3-phase Unbal: 3-phase
Voltage inputs (Un)		250/430VAC	250/433VAC
Current inputs (In)		5AAC 27AAC	5AAC
Digital inputs		1 (key pad enabling)	N.A.
Primary of CT/VT		CT: prog. up to 5000A	CT: prog. up to 5000A
Measurements:	Variables	STD V, A, VA, var, PF, Wh, VAh, varh. Max: VA, W, var	TRMS method Sys: V_{LL}, V_{LN}, A, W, var, PF; Total: Wh, varh; Partial: Wh, varh; single-ph: V_{LL}, V_{LN}, A, W, var, PF
Harmonic distortion		N.A.	N.A.
Outputs:	Pulse	1 (open collector)	1 (open collector)
	Alarm	1 (TRIAC type)	N.A.
	Analogue	N.A.	N.A.
	Serial	RS485	N.A.
Digital filter		N.A.	N.A.
Other characteristics		Display scrolling of all the variables by means of the front key-pad.	Only WM2 96: modular concept, plug-in modules DC power supply
Approvals		CE	CE-cURus, CSA (96)-
Power supply	Protection degree	115, 230VAC IP40	24, 48, 115, 230VAC 96 only: 18 to 60, 90 to 260VAC/DC IP40 (DIN) IP65 (96)



WM12 96 WM12 DIN

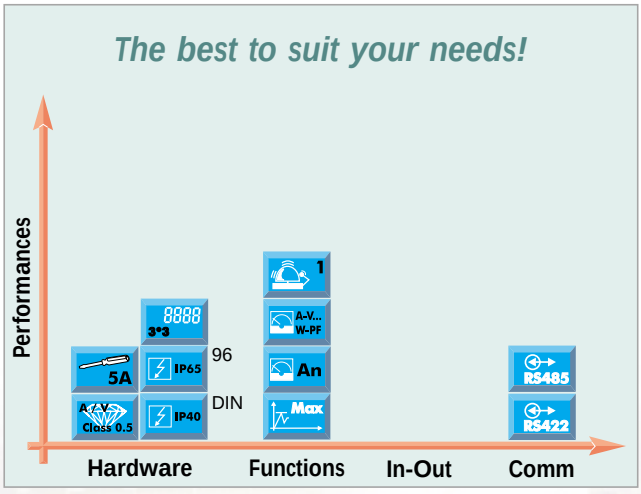
WM12 DIN and WM12 96 are general purpose multi function meters that allow to monitor all the mains parameters of an electrical line or load. The compact housings combined with a complete selection of measurements allow the instruments to be mounted in all the switch and control gears as local indicators, instead of the classical single function analogue or digital panel meters.

Power Analyzers WM12 DIN WM12 96

Housing (H x W)	107.5x90mm (WM12 DIN) (6 DIN mod.) 96x96mm (WM12 96)
Display type	LED
Variables on display	YES
Instantaneous variables	3 DGT
Energy variables	N.A.
Accuracy	W-VA:±(1% F.S.+1DGT) var:±(2% F.S. +1DGT) V_{LL}: ±(1.5% F.S. +1DGT) V_{LN}-A:±(0.5% F.S. +1DGT)
Temperature drift	≤200ppm/°C
Sampling rate	1.5 sample/s
System type	unbalanced: 1-2-3-phase
Voltage inputs (Un)	100/208VAC, 400/660VAC
Current inputs (In)	5AAC
Digital inputs	N.A.
Primary of CT / VT	Prog.: CT up to 5000A, VT up to 10kV
Measurements:	TRMS method
Variables	Sys: V_{LL}, V_{LN}, An, VA, VA_{dmd}, W_{dmd}, $W_{dmd\ peak}$, Hz single-phase: V_{LL}, V_{LN}, A, VA, W, var, PF
Harmonic distortion	N.A.
Outputs: Pulse	N.A.
Alarm	N.A.
Analogue	N.A.
Serial	RS422/485 (Modbus)
Digital filter	Action: on variables and outputs
Other characteristics	Over neutral current or under and over voltage indication (warning signal)
Power supply	24, 48,115, 230VAC; 18 to 60VDC
Approvals	CE, cURus (cCSAus only WM2 96)
Protection degree	IP40 (WM12 DIN) IP65 (WM12 96)

The unit is provided with some unique installation visual status functions like:

- the window control of the mains 3-phase voltage notifying the user at a glance if the mains is supplied out of the requested power supply tolerance,
- the neutral current control showing immediately anyload or installation anomaly due to high harmonic distortion or load insulation loss (high earth leakage current).



WM14 96 WM14 DIN

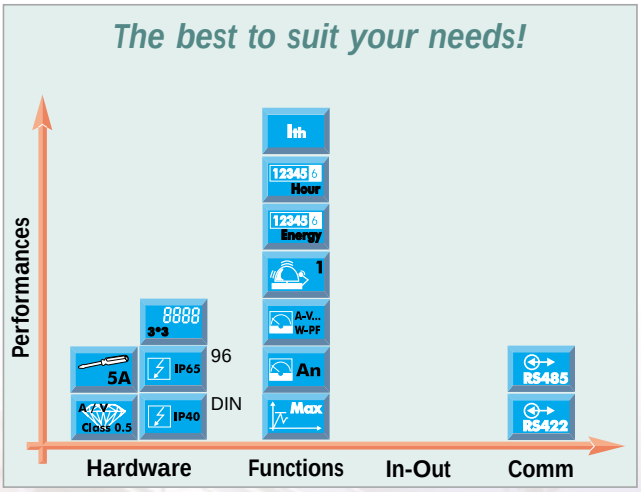
WM14 DIN and WM14 96 are basic power analyzers that can be used in all the applications where it is needed to measure the main electrical parameters and to transmit them to a PC. WM14 is cheap, compact and is available either for panel mounting or DIN-rail mounting.

WM14 is the natural evolution of WM12. It maintains the same advantages and measurement capabilities of the multi function meter providing the following additional features and benefits:

- metering of both active and reactive energy in order to survey not only the typical load parameters but also the consumptions;
- measurement of the thermal current, by single phase, and recording of the maximum demands. The integration time is programmable. This information will let the maintenance people know if the over current protections (fuses, automatic switches, etc.) are adequately preset and in case of trip which is their real current;
- hour counter meter function. If the instrument is used on board of a machine or a generating-set, in addition to the already mentioned data, it is also possible to know for how long those machines are being used.
  A proper “machine usage” cost and/or mechanical maintenance can be estimated and planned.
  Furthermore, the extra cost of an external classical hour counter meter can be avoided.

Power Analyzers WM14 DIN WM14 96

Housing (H x W)	107.5x90mm (WM14 DIN) (9 DIN mod.) 96x96mm (WM14 96)
Display type	LED
Variables on display	YES
Instantaneous variables	3 DGT
Energy variables	8+1 DGT
Hours	5+2
Accuracy	W-VA:±(1% F.S.+1DGT) var:±(2% F.S. +1DGT) V_{LL}: ±(1.5% F.S. +1DGT) V_{LN}-A:±(0.5% F.S. +1DGT) kWh: class 2, kvarh: class 3
Temperature drift	≤200ppm/°C
Sampling rate	1.5 sample/s
System type	unbalanced: 1-2-3-phase; bal.: 3-ph
Voltage inputs (Un)	100/208VAC, 400/660VAC
Current inputs (In)	5AAC
Digital inputs	N.A.
Primary of CT / VT	Prog.: CT up to 5000A, VT up to 10kV
Measurements: **Variables**	TRMS method Sys: V_{LL}, V_{LN}, An, VA, VA_{dmd}, W, W_{dmd}, $W_{dmd\ max}$, Hz Wh, varh, h; single-phase: V_{LL}, V_{LN}, A, VA, W, var, PF, A_{dmd}, $A_{dmd\ max}$,
Harmonic distortion	N.A.
Outputs: Pulse	N.A.
Alarm	N.A.
Analogue	N.A.
Serial	RS422/485 (Modbus)
Digital filter	Action: on variables and outputs
Other characteristics	Over neutral current or under and overvoltage indication (warning signal)
Power supply	24, 48,115, 230VAC 18 to 60VDC
Approvals	CE, cURus, cCSAus
Protection degree	IP40 (WM14 DIN) IP65 (WM14 96)



WM22 DIN

WM22 DIN is a modular power analyzer that allows to monitor all the mains parameters of an electrical line or load and to control one of them. The amazing design of the housing combined with outstanding performances makes WM22 DIN an instrument to be used in all the applications up to 5000A and up to 200kVL-L.

The four remarkable features of WM22 DIN

- Direct measurement of up to 90A. No external current transformer needed.

- Simultaneous display of four variables. Information available at a glance.
- A full range of measurements available. Everything under control.
- Plug and play output modules. Easy interfacing to external devices.

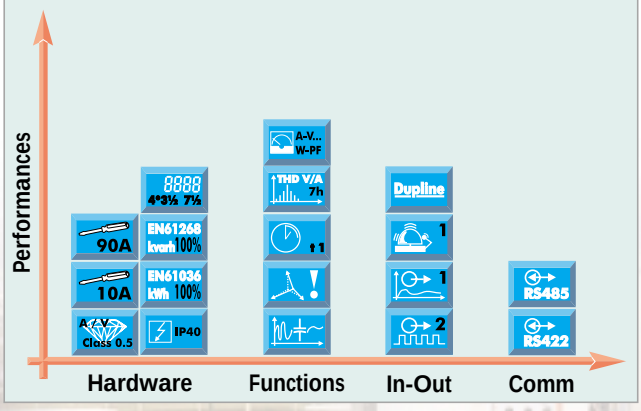
The main advantages

- Total harmonic analysis of both current and voltage notifying potential load failures.
- Phase asymmetry control notifying line failures.
- Dual pulse output, analogue output, RS485 or Dupline port providing the communication to PLC's, to PC's and to Dupline building automation system.
- Serial communication and wrong connection of the current inputs status indications making the instrument installation: easy, fast and out of wiring errors.
- Self power supply working even in case of one phase line failure granting the measurement of all the variables all the time.

Modular Power Analyzer WM22 DIN

Housing (H x W)		90x162.5mm (9 DIN modules)
Display type		LCD (bk lighted)
Variables on display		YES
Instantaneous variables		4x3 1/2 DGT
Energy variables		7 1/2 DGT
Accuracy		V_{LN}-A:±(0.5 RDG+1DGT) W-VA:±(1% RDG+1DGT) Class 1 (EN61036) Class 2 (EN61268)
Temperature drift		≤200ppm/°C
Sampling rate		2 samples/s
System type		Bal.: 3-phase, Unbal: 3-phase
Voltage inputs (Un)		57/100VAC, 120/208VAC 230/400VAC, 380/660VAC
Current inputs (In)		Ib: 5A, Imax: 10AAC Ib: 20A, Imax 90AAC
Digital inputs		N.A.
Primary of CT / VT		Prog.: CT up to 5000A, VT up to 10kV
Measurements:		TRMS method
	Variables	Sys: V_{LN}, V_{LL}, VA, W, W_{dmd}, VA_{dmd}, var, PF, Hz, total Wh, total varh, partial Wh, partial varh. single-phase: V_{LN}, A VA, W, var, PF, THD.
Harmonic distortion		THD up to the 7th H (V and A)
Outputs:	**Pulse**	2 (open collector)
	Alarm	1 (open collector or relay)
	Analogue	1 (20mA, 10V)
	Serial	RS422/485 (Modbus)
	Dupline	kWh and kvarh data transmission, water and gas inputs and data transmission
Digital filter		Action: on variables and outputs
Other characteristics		Modular concept, plug-in modules. Phase asymmetry control
Power supply		Self power supply, 24, 48 115, 230VAC, 18-60 73-143VDC
Approvals		CE
Protection degree		IP40

The best to suit your needs!



WM23 96

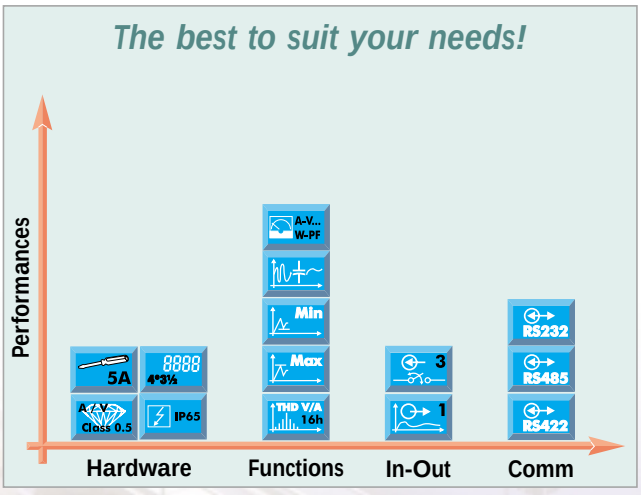
WM23 96 is a modular power quality analyzer that allows the operator to continuously monitor the mains. All measurements with a direct connection up to 830VAC (phase-phase), up to 20kV (VT connection) and up to 5.000A (CT connection) allow the operator to use WM23-96 in all the light and medium industry applications. This flexible instrument has a standard IP65 protection degree, a 0.5 accuracy class, an FFT analysis up to the 16th harmonics and, on request, up to 2 alarms, one analogue output and one RS422/485 or RS232 communication port.

WM23 96 can be equipped with different modules like the three digital input one. Two of those inputs can be connected to the official Watt-hour meter to synchronise the W and VA demand calculation, while the last input can be used to lock the programming of the equipment.

This power quality analyzer is able to show any single current and voltage total harmonic distortion on which it is possible to connect an alarm output. The wide LCD display with high contrast feature is able to show all the measurements and in addition the recording of the MAX active powers: W_{L1}, W_{L2}, W_{L3}, (on request A_{L1}, A_{L2}, A_{L3} max value) W_{sys}, W_{dmd} and the MIN power factors: PF1, PF2, PF3, PF_{sys}.

Power Quality Analyzer WM23 96

Housing (H x W x D)	96x96x140mm
Display type	LCD (back lighted)
Variables on display	YES
Instantaneous variables	4x3 1/2 DGT
Energy variables	N.A.
Accuracy	V_{LN}-A: ±(0.5% F.S.+2DGT) V_{LL}-W-VA: ±(1% F.S. +2DGT) var: ±(2% F.S. +2DGT) THD: ±(3% F.S. +2DGT)
Temperature drift	≤200ppm/°C
Sampling rate	1.5 samples/s
System type	Bal.: 3-phase, Unbal.: 3-phase
Voltage inputs (Un)	57/100VAC, 120/208VAC 230/400VAC, 380/660VAC
Current inputs (In)	5A
Digital inputs	2 for W_{dmd} and VA_{dmd} syncronization 1 for program lock
Primary of CT / VT	Prog.: CT up to 5000A, VT up to 20kV
Measurements:	TRMS method
Variables	Sys: V_{LN}, V_{LL}, An, VA, W, W_{dmd}, VA_{dmd}, var, PF, Hz. Single-phase: V_{LN}, V_{LL}, A, W, var, PF, THD.
Harmonic distortion	THD up to 16th H (V and A)
Outputs: Pulse	N.A.
Alarm	Up to 2 (relay or open collector)
Analogue	1 (5mA, 10mA, 20mA, 1V, 5V, 10V DC)
Serial	RS485 (Modbus), RS232
Digital filter	Action: on variables and outputs
Other characteristics	Modular concept, plug-in modules. Phase asymmetry control
Power supply	24, 48, 115, 230VAC 18 to 60V AC/DC, 90 to 260VAC/DC
Approvals	CE, cURus, cCSAus
Protection degree	IP65



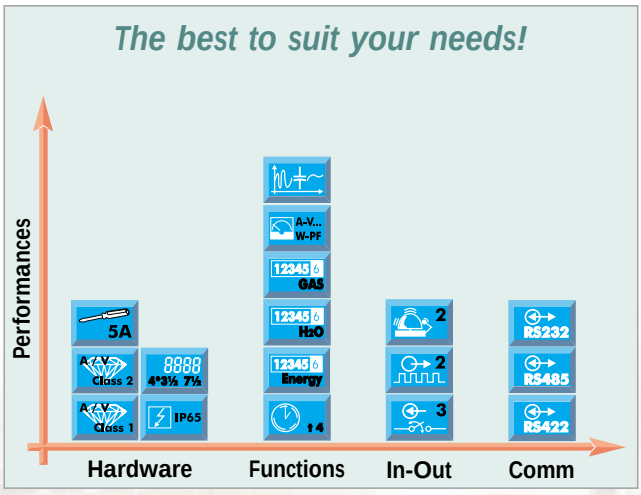
WM24 96

WM24 96 is a modular universal utility meter that allows the operator to continuously monitor the mains and measure energy, gas and water by total or partial metering. All measurements with a direct connection up to 830VAC (phase-phase), up to 20kV (VT connection) and up to 5.000A (CT connection) allow the operator to use WM24 96 in all the light and medium industry applications. This universal utility meter has a standard IP65 protection degree and the

metering of energy is in compliance with class 1 “EN61036” and class 2 “EN61268”.
WM24 96 is capable to measure and control, by means of the two optional alarm outputs, all the main variables and the maximum demanded power.
It is able to measure and display the total energies in the four quadrants (+kvar-L, -kvar-L, +kvar-C, -kvar-C). The access to the programming parameters can be locked in order to avoid undesired modifications.
Furthermore the measured energies can be managed by time period/tariff: t1-t2-t3-t4 by means of two input contacts. Those contacts can be used, in alternative, as counter inputs to measure m³ of gas and water.

Universal Utility Meter WM24 96

Housing (H x W x D)	96x96x140mm
Display type	LCD (back lighted)
Variables on display	YES
Instantaneous variables	4x3 1/2 DGT
Energy variables	7 1/2 DGT
Accuracy	V_{LN}-A: ±(0.5% RDG+1DGT) W-VA: ±(1% RDG+1DGT) Class 1 (EN61036) Class 2 (EN61268)
Temperature drift	≤200ppm/°C
Sampling rate	1.5 samples/s
System type	Bal.: 3-phase, Unbal.: 3-phase
Voltage inputs (Un)	57/100VAC, 120/208VAC, 230/400VAC, 380/660VAC
Current inputs (In)	5A
Digital inputs	3 for time period management 1 for program lock
Primary of CT / VT	Prog.: CT up to 5000A, VT up to 20kV
Measurements:	TRMS method
Variables	Sys: V_{LN}, V_{LL}, VA, W, W_{dmd}, VA_{dmd}, var, PF, Hz, total varh, partial Wh, partial varh, gas, H_2O. Single-phase: V_{LN}, A, VA, W, var, PF.
Harmonic distortion	N.A.
Outputs: Pulse	Up to 2 (open collector or relay)
Alarm	Up to 2 (relay or open collector)
Analogue	N.A.
Serial	RS485 (Modbus), RS232
Digital filter	Action: on variables and outputs
Other characteristics	Modular concept, plug-in modules, phase asymmetry control, energy time period management
Power supply	24, 48, 115, 230VAC 18 to 60V AC/DC, 90 to 260VAC/DC
Approvals	CE, cURus, cCSAus
Protection degree	IP65



SPT 90

SPT 90 is a generation of programmable “smart” transducers, for the measurement of all major characteristics of an electrical system including power, energy, voltage, current and frequency.
The SPT 90 series has a large number of functions available to the user.
Configuration and control can be done in field, interfacing the transducer at high levels as a remote unit.

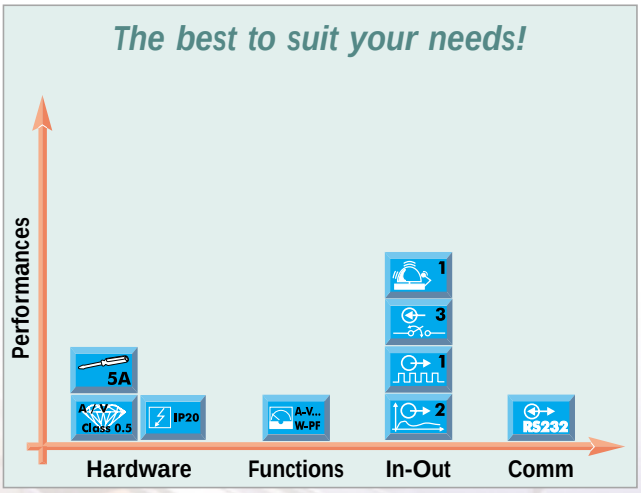
Smart Power Transducer SPT 90

Housing (H x W x D)	90x90x140mm
Display type	LED
Variables on display	N.A.
Instantantaneous variables	N.A.
Energy variables	N.A.
Accuracy	V_{LN}, A, Hz: 0.5% F.S.
Temperature drift	≤300ppm/°C
Sampling rate	Response time: ≤200ms
System type	Bal.: 1-3-phase Unbal.: 3-phase
Voltage inputs (Un)	57/100VAC, 250/433VAC
Current inputs (In)	1AAC, 5AAC
Digital inputs	N.A.
Primary of CT / VT	Prog.: CT up to 5000A, VT up to 100kV
Measurements:	TRMS method
Variables	Sys: V, A_{max}, VA, W, W_{dmd}, var, PF, Hz, Wh, varh. Single-phase: V
Harmonic distortion	N.A.
Outputs: Pulse	1 (open collector type or relay)
Alarm	1 (open collector or relay)
Analogue	Up to 2 (5mA, 10mA, 20mA,1V, 5V, 10V DC)
Serial	RS232
Digital filter	N.A.
Other characteristics	W integration time programming. Parameter programming by means of removable key-pad or by RS232, port (with proper Software)
Power supply	18 to 60VAC/DC 90 to 260VAC/DC
Approvals	CE, cURus, CSA
Protection degree	IP20

SPT 90/SptSoft
is a software tool that can be used to easily down-load or upload the programming parameters from an SPT 90 to a PC and from a PC to a single SPT.

The advantages
Compared to a traditional transducer SPT 90 offers:

- TRMS measurement, that means reliable and true measurement not affected by distortion
- Selection among many types of measurements without changing the transducer
- Wide scaling capability solving the major field application problems
- Combination of analogue and pulse outputs
- One integrated transducer with dual analogue output



WM3 96

WM3 96 is a modular analyzer of the power quality that, thanks to a 32-bit µ-Processor, allows the operator to continuously and completely monitor the mains. All measurements with a direct connection up to 830VAC (phase-phase), up to 600kV (VT connection) and up to 30kA (CT connection) allow the operator to use WM3 96 in any kind of installation. WM3 96 is a flexible, powerful instrument that can be used in any kind of situation, thanks

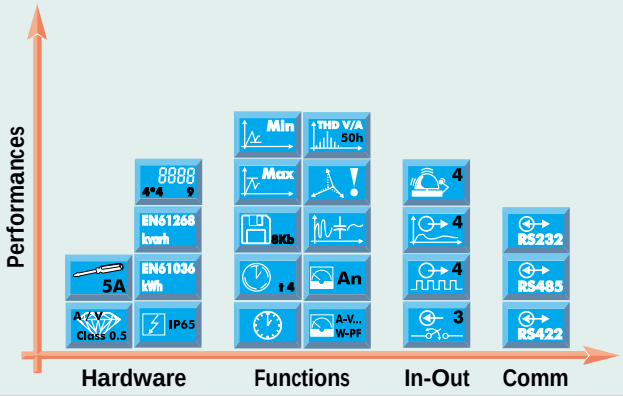
Modular Power Quality Analyzer WM3 96

Housing (H x W x D)	96x96x140mm
Display type	Graph LCD back lighted
Variables on display	YES
Instantaneous variables	Sel: 4x3 1/2 DGT or 4x4 DGT
Energy variables	4x9 DGT, 4x6 DGT
Accuracy	V_{LN}-A:±(0.5 RDG+1DGT) Hz:±0.1% F.S. THD: ±1% F.S. Class 1 (EN61036) Class 2 (EN61268)
Temperature drift	≤200ppm/°C
Sampling rate	10 samples/s
System type	Bal.: 1-3 phase Unbal.: 3-phase
Voltage inputs (Un)	Autoranging 240/415VAC, 400/690VAC
Current inputs (In)	Autoranging 1/5AAC
Digital inputs	3 independent for time period synchro.
Primary of CT / VT	Prog.: CT up to 30000A VT up to 600kV
Measurements:	TRMS method
Variables	Sys: V_{LN}, V_{LL}, An, VA, W, W_{dmd}, VA_{dmd}, An_{dmd}, PF_{dmd}, var, PF, Hz, Wh, varh. Single-phase: V_{LN}, V_{LL}, A, W, var, PF, THD.
Harmonic distortion	THD and single H up to the 50th H (V, A)
Outputs: Pulse	Up to 4 (open collector type or relay)
Alarm	Up to 4 (open collector or relay)
Analogue	Up to 4 (5mA, 10mA, 20mA, 1V, 5V, 10V DC)
Serial	RS485 (Modbus), RS232
Digital filter	Action: on variables and outputs
Other characteristics	Real time clock with alarms and Min/Max variable recording. W, VA, PF and An integration time programming. Energy time period management.
Power supply	18 to 60VAC/DC, 90 to 260VAC/DC
Approvals	CE, cURus, CSA
Protection degree	IP65

to its mechanical and electrical features, such as for instance: IP65 protection degree, 0.5 accuracy class, 10 samplings/second, FFT analysis up to the 50th harmonic, tariff management and automatic logging of the alarms together with the availability of any kind of input/output interfaces.

The already powerful performances of WM3 96 become outstanding performances with the addition of the RS232+ RTC module.

The best to suit your needs!



Analysis of the power quality and control of the electrical parameters

The problems that more frequently occur in electrical systems with:

- inverters and power converters;
- switching power supplies for computer and communication system applications;

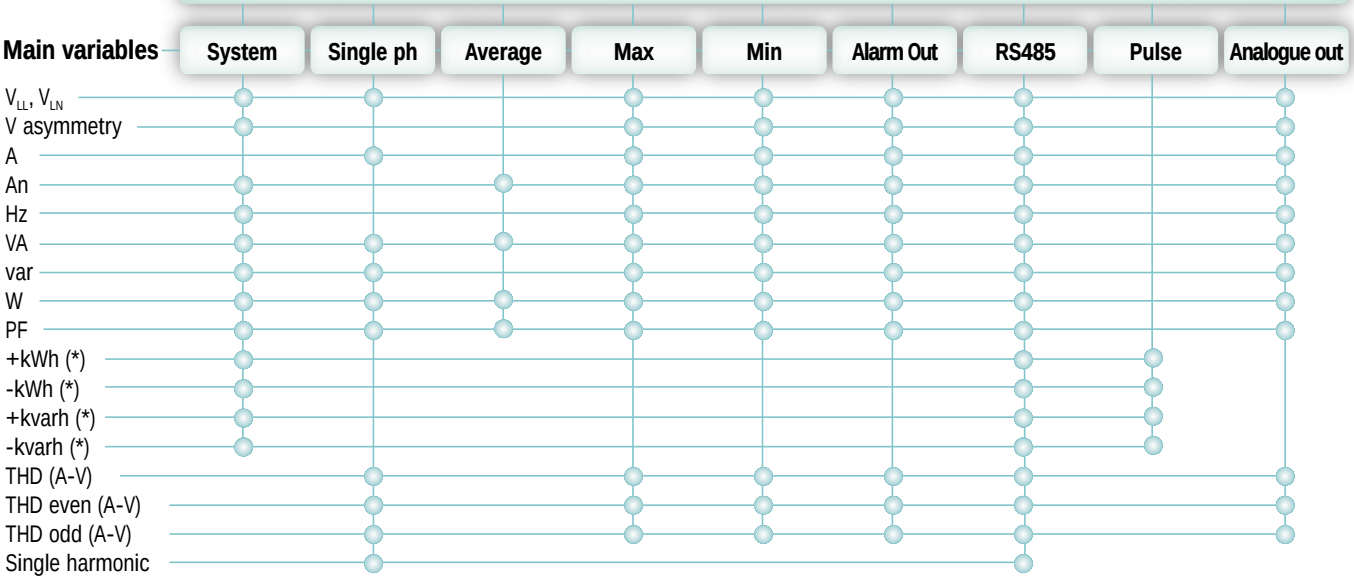
are the following:

- failures on compensation capacitors;
- blowing of capacitor fuses;
- overheating of power supply transformers with a load current below the rated value;
- overheating of motors and frequent failures;
- high neutral conductor currents;
- problems on electronic motor controls.

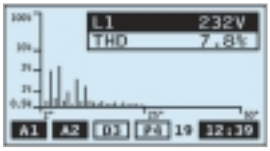
They are mainly due to the harmonic contents of currents and voltages.

The best solution is WM3 96 that allows to continuously monitor the harmonic contents of currents and voltages together with all other electrical parameters. The control of more than one electrical parameter by means of alarm set-points and the automatic recording of events allow the operator to monitor any anomaly of the installation and of the loads in real time, so as to promptly decide and plan any maintenance actions, thus avoiding possible damages to the loads and/or expensive stopping of the machinery.

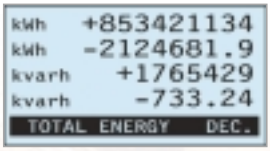
Variables that can be monitored and displayed



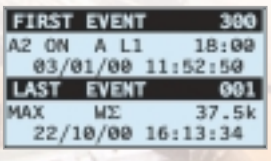
(*) Total and time-period energies



- Histogram displaying of the harmonic contents relating to every single phase for A and V
- Complete harmonic analysis up to the 50th harmonic
- Numerical displaying as an absolute and percentage value of the single harmonic
- Four-quadrant displaying of the harmonic phase with source detection (generated harmonics and imported harmonics)



- Energy consumption storage. The RS232+RTC module allows the storage of the energy consumption of the previous two months.



- It's possible to record up to 480 events that can be the combination of alarms, diagnostics, minimum and maximum value, with reference to: date, time and variable being controlled.

WM4 96

WM4 96 is a Universal Utility meter and Power Quality Analyzer. This high-tech instrument has been developed to meet the most advanced application needs. WM4 96 offers to the user many advantages and solutions that can be summarised in:

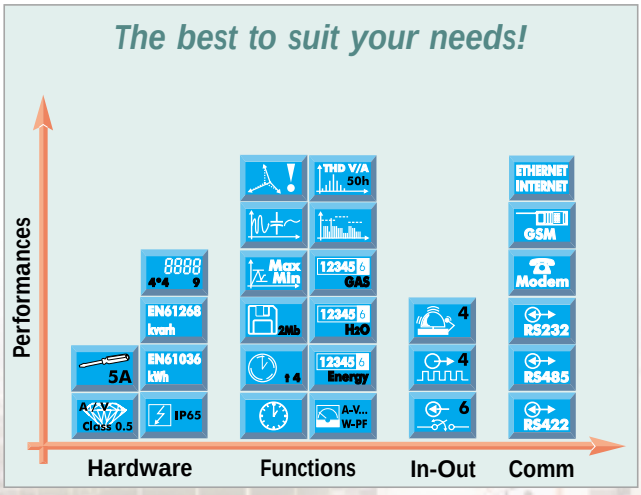
- Load failure prevention by:
  quick assembly and maintenance using Plug and Play modules

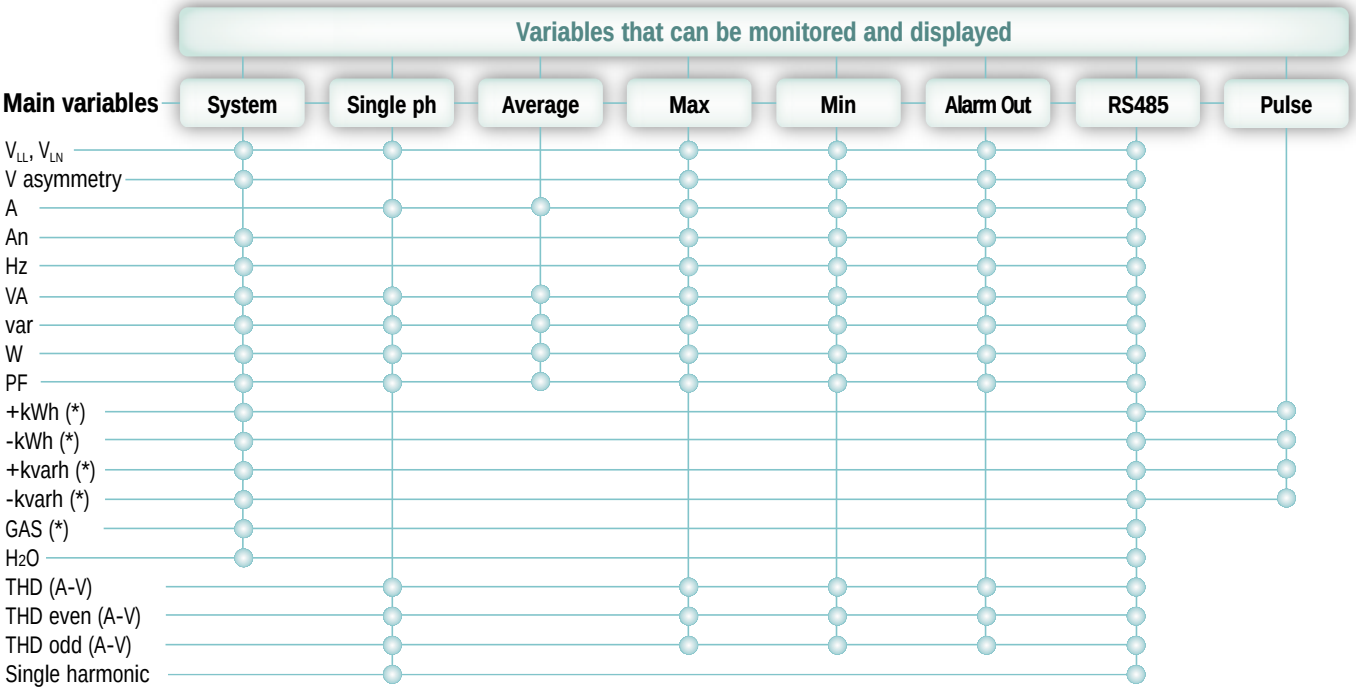
harmonic analysis (A/V) with source detection and control; up to 4 alarms for a powerful variable control; alarms logging and data stamping.
- Remote control facilities: up to 4 pulse outputs, RS485 port (Modbus RTU), RS232 port.
- Load profile display to keep supply costs under control.
- Energy cost allocations with independent import/export kWh/kvarh and kWh/kvarh multi-tariff management
- Water and gas metering and communication using the same instrument.

RS232 serial communication port provided with a 2Mb data memory.

Modular Universal Utility Meter WM4 96

Housing (H x W x D)	96x96x140mm
Display type	Graph LCD back lighted
Variables on display	YES
Instantaneous variables	Sel: 4x3 1/2 DGT or 4x4 DGT
Energy variables	4x9 DGT, 4x6 DGT
Accuracy	V_{LN}-A: ±(0.5 RDG+1DGT) Hz: ±0.1% F.S. THD: ±1% F.S. Class 1 (EN61036) Class 2 (EN61268)
Temperature drift	≤200ppm/°C
Sampling rate	10 samples/s
System type	Bal.: 1-3 phase Unbal.: 3-phase
Voltage inputs (Un)	Autoranging 240/415VAC, 400/690VAC
Current inputs (In)	Autoranging 1/5AAC
Digital inputs	Up to 6 independent for time period synchronization, Gas and H_2O meters
Primary of CT / VT	Prog.: CT up to 30000A VT up to 600kV
Measurements:	TRMS method
Variables	Sys: V_{LN}, V_{LL}, An, VA, W, W_{dmd}, VA_{dmd}, var_{dmd}, PF_{dmd}, var, PF, Hz, Wh, varh, gas, H_2O. Single-phase: V_{LN}, V_{LL}, A, W, var, PF, THD.
Harmonic distortion	THD and single H up to the 50th H (V, A)
Outputs: Pulse	Up to 4 (open collector type)
Alarm	Up to 4 (open collector or relay)
Analogue	N.A.
Serial	RS485 (Modbus), RS232, Ethernet Modem-GSM management
Digital filter	Action: on variables and outputs
Other characteristics	Real time clock with alarms and Min/Max variable recording (2Mb memory). Energy time period and gas, H_2O management. Official watt-hour meter interface.
Power supply	18 to 60VAC/DC, 90 to 260VAC/DC
Approvals	CE, cURus, CSA
Protection degree	IP65



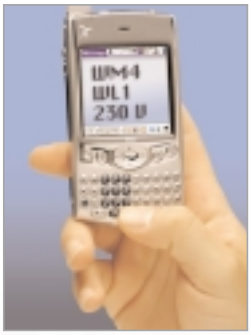


(*) Total and time-period energies

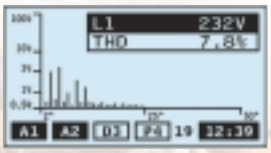
Official watt-hour meter interface. The 3 interfacing methods of WM4 96 are:

- Direct measurement for the power quality analysis (LV or MV/HV connection).
- Indirect energy and power measurements by means of official Watt-hour meters (LV or MV/HV connection).
- Direct measurements of the instantaneous variables (LV connection) and indirect measurements of the energy variables (LV or MV/HV connection).

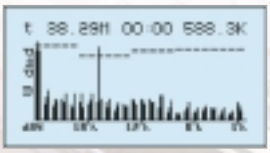
Powerful variable analysis and great communication capabilities: this is the strength of WM4 96



- Energies-water-gas and instantaneous variables readable on the display of your GSM mobile phone giving you maximum control freedom, saving time and money.
- Alarms transmitted as soon as they occur via GSM or analogue modem notifying the plant abnormal conditions.
- Data logging and stamping of up to 8 programmable instantaneous variables for a time duration up to 90 weeks with date and time references to build up the history of your electrical installation.
- Wm4Soft network communication software to download, manually or automatically (via RS485-analogue modem-GSM modem) up to 2Mb data stored in the WM4 96. This information can be simply plotted in an Excel spreadsheet.
- Continuous data stamping and communication: RS232, RS485, modem, GSM.
- Powerful data acquisition by means of Wm4Soft and mobile phones wherever you are.



Mains quality analysis because the harmonics are cause of load failures and production stop.



Load profile display with alarms to keep the energy consumption and power cost under full control.

PQT 90

PQT 90 is a Power Quality Transducer which offers to the user many advantages and solutions:

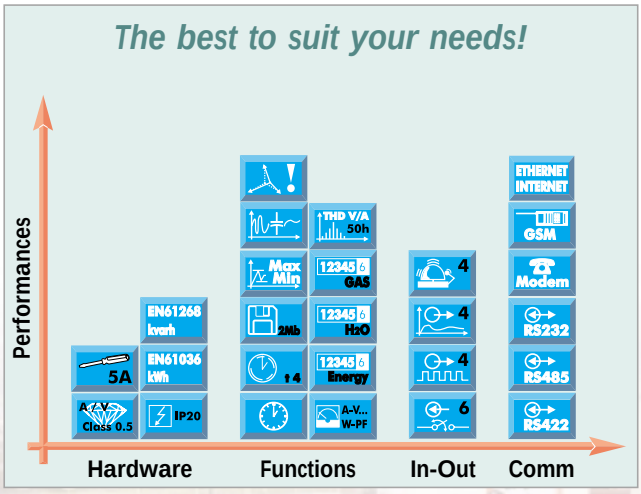
- Quick assembly and maintenance using Plug and Play modules.
- Load failure prevention: harmonic analysis (A/V) with source detection and control; up to 4 alarms for a powerful variable control;
  Alarms logging and data stamping.
- Remote control facilities: up to 4 pulse outputs, up to 4 analogue outputs, RS485, RS232 port
- Energy cost allocations with independent import/export and multi-tariff active/reactive energy meters
- Water and gas metering and communication using the same instrument.

The main applications where the PQT 90 can be fully exploited

- Electrical parameters analysis, control and utility metering in the medium and heavy industry.
- Electrical parameters analysis and utility metering in the public buildings and shopping centres particularly when there is the need to collect the data from many buildings in different locations by means of PqtSoft.
- Electrical parameters analysis and local control in the unguarded sites with remote centralised supervision capability using GSM communication and PqtSoft data acquisition system.

Power Quality Transducer PQT 90

Housing (H x W x D)		90x90x140mm
Display type		N.A.
Variables on display		N.A.
Instantaneous variables		N.A.
Energy variables		N.A.
Accuracy		V_{LN}-A: ±(0.5%RDG+1DGT) Hz: ±0.1% F.S. THD: ±1%F.S. Class1 (EN61036) Class2 (EN61268)
Temperature drift		≤200ppm/°C
Sampling rate		response time:≤200ms
System type		Bal.: 1-3-phase Unbal.: 3-phase
Voltage inputs (Un)		Autoranging: 240/415VAC, 400/690VAC
Current inputs (In)		Autoranging: 1/5AAC
Digital inputs		Up to 6 independent for synchro and gas, H_2O meters
Primary of CT / VT		Prog to: CT 30000A, VT 600kV
Measurements:		TRMS method
	Variables	Sys: V_{LN}, V_{LL}, VA, W, W_{dmd}, VA_{dmd}, var_{dmd}, PF_{dmd}, var, PF, Hz, Wh, varh, gas, H_2O Single phase: V_{LN}, V_{LL}, A, VA, W, var, PF, THD.
Harmonic distortion		Up to the 50th H (V and A)
Outputs:	**Pulse**	Up to 4 (open collector or relay)
	Alarm	Up to 4 (open collector or relay)
	Analogue	Up to 4 (5mA, 10mA, 20mA, 1V, 5V, 10V DC)
	Serial	RS485 (modbus), RS232, Ethernet Modem-GSM management
Digital filter		Action: on variables and outputs
Other characteristics		Real time clock with alarms and Min/Max variable continuos recording (2Mb memory). Energy time period and gas, H_2O management. Official watt-hours meter interface.
Power supply		18 to 60VAC/DC, 90 to 260VAC/DC
Approvals		CE, cURus, CSA
Protection degree		IP20



Power variable analysis and great communication capabilities: this is the strength of PQT 90

- Energies-water-gas and instantaneous variables readable on the display of your GSM mobile phone giving you maximum control freedom, saving time and money.
- Alarms transmitted as soon as they occur via GSM or analogue modem, notifying the plant abnormal conditions.
- Data logging and stamping of up to 8 programmable instantaneous variables for a time duration up to 90 weeks with date and time references to build up the history of your electrical installation.
- PqtSoft Network communication software to download, manually or automatically (via RS485-analogue modem GSM modem), up to 2Mb data stored in the PQT 90.
  This information can be plotted simply in an Excel spreadsheet.
- Pqt Soft Remote to easily download or upload the programming parameters from a PQT 90 to a PC and viceversa.
- Continuous data stamping and communication: RS232, RS485, modem, GSM.
- Powerful data acquisition by means of PqtSoft and mobile phones wherever you are.

PqtKit the wireless solution of PQT ...

... GSM communication and download software PqtSoft

Variables that can be managed by PQT 90

Main variables	System	Single ph	Average	Max	Min	Alarm Out	RS485	Pulse	Analogue out
V_{LL}, V_{LN}	●	●		●	●	●	●		●
V asymmetry	●	●		●	●	●	●		●
A	●	●	●	●	●	●	●		●
An	●	●		●	●	●	●		●
Hz	●	●		●	●	●	●		●
VA	●	●	●	●	●	●	●		●
var	●	●	●	●	●	●	●		●
W	●	●	●	●	●	●	●		●
PF	●	●	●	●	●	●	●		●
+kWh (*)	●						●	●	
-kWh (*)	●						●	●	
+kvarh (*)	●						●	●	
-kvarh (*)	●						●	●	
GAS (*)	●						●		
H_2O	●						●		
THD (A-V)		●		●	●	●	●		●
THD even (A-V)		●		●	●	●	●		●
THD odd (A-V)		●		●	●	●	●		●
Single harmonic		●					●		

(*) Total and time-period energies

Official watt-hour meter interface. The 3 interfacing methods of PQT 90 are:

- Direct measurement for the power quality analysis (LV or MV/HV connection).
- Indirect energy and power measurements by means of official Watt-hour meters (LV or MV/HV connection).
- Direct measurements of the instantaneous variables (LV connection) and indirect measurements of the energy variables (LV or MV/HV connection).

AR1060 WEB-server

The “96 series” modular system can be equipped now with a brand new Ethernet/Internet module with WEB server capability. This module can be used in combination to our high-end instruments WM4 96 and PQT 90.
AR1060 is used instead of the RS485 communication module and improves significantly the already high communication and data logging capability of WM4 and PQT adding the possibility to connect those instruments to a LAN (local area network) or, according to the needs, to the WEB.

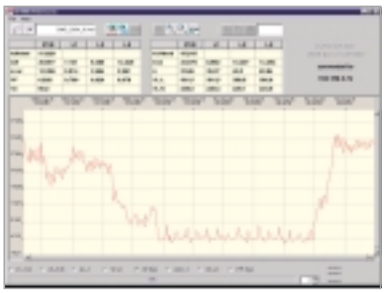
AR1060 as a WEB server allows the single WM4 and/or PQT to display on every PC connected to the LAN, in a very easy way, the instantaneous variables and energy-water-gas being measured. The totalised energy-gas-water variables are displayed in a proper numerical table while the instantaneous electrical parameters are available in numerical format as before and as a graph as well. The same data are also available by means of Internet through a local server so to grant a full data protection (firewall).

Internet Ethernet Module AR1060

Description	Ethernet/Internet communicator module with WEB server capability. Compatible with WM4 and PQT
Displayable variables	All the instantaneous single phase and system variables of WM4 and PQT except for the harmonics. All the 8 logged vari ables are displayed in numeric format or, one at a time, as a graph.
Downloadable variables	All the 8 logged variable of WM4 and PQT to TXT format (Excel spread-sheet)
Protocols	IP/ TCP/ HTTP/ TFTP
WEB page memory	512kbyte
Connection	RJ45 10 Base T
Approvals	CE, cURus, CSA
Other characteristics	The module firmware can be upgraded by LAN or Point to Point connection

Up to 8 selectable and logged variables can be downloaded from the instruments also via the web. Those parameters, together with Energy-gas-water totalised consumptions which are available as 12 TXT monthly files, can be furthermore worked out in an Excel spread sheet so to evaluate parameters, consumption trends and related costs. That information will help the users to plan a proper maintenance scheme and to achieve cost reductions where possible.

Download the web server software from the WEB server home page.



Example of instantaneous variables displayed by AR1060 WEB server.

CVT DIN

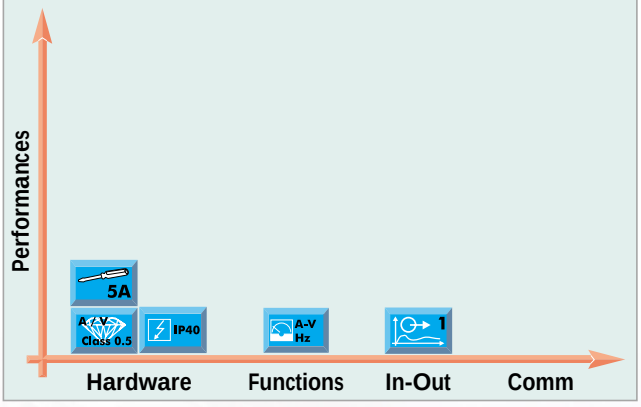
CVT DIN is a series of compact and simple transducers for the measurement of voltage, current and frequency. In a module which is 71.5 mm wide, suitable for DIN rail mounting, it offers three basic hardwares to measure: AC voltage and current; DC voltage and current; frequency. The current and voltage models allow to adjust the transducer calibration from 50 to 130 % of the rated inputs simply using a digital multimeter set on the resistance measurement.

Compact Transducer CVT DIN

Housing (H x W)	89x71.5mm
Display type	N.A.
Variables on display	N.A.
Instantaneous variables	N.A.
Energy variables	N.A.
Accuracy	V, I, Hz: 0.5% F.S.
Temperature drift	≤200ppm/°C
Sampling rate	Response time:≤300ms
System type	1-phase
Voltage inputs (Un)	100VAC, 500VAC, 60mVDC, 10VDC 200VDC
Current inputs (In)	1AAC, 5AAC, 1ADC
Digital inputs	N.A.
Primary of CT / VT	All
Measurements:	STD
Variables	VAC, VDC, AAC, ADC, Hz (45-55Hz, 55-65Hz, 350-450Hz)
Harmonic distortion	N.A.
Outputs: Pulse	N.A.
Alarm	N.A.
Analogue	0-20, 4-20mA; ±1V, 0-10V
Serial	N.A.
Digital filter	N.A.
Other characteristics	Current or voltage input in the same transducer. Field adjustment from 50 to 130% of the A/V input
Power supply	24VAC, 48VAC, 115VAC, 230VAC
Approvals	CE
Protection degree	IP40

Input	Formula	Example
5AAC	R_{adj}=5000/ A_{in} (A)	A_{in}=6A R_{adj}=2500Ω
500VAC	R_{adj}=1500000/ V_{in} (V)	V_{in}=250V R_{adj}=6000Ω
1AAC	R_{adj}=3000/ A_{in} (A)	A_{in}=0.9A R_{adj}=3333Ω
100VAC	R_{adj}=30000/ V_{in} (V)	V_{in}=80V R_{adj}=3750Ω
1ADC	R_{adj}=3000/ A_{in} (A)	A_{in}=0.9A R_{adj}=3333Ω
200VDC	R_{adj}=600000/ V_{in} (V)	V_{in}=190V R_{adj}=3157Ω
60mVDC	R_{adj}=180000/ V_{in} (V)	V_{in}=35mV R_{adj}=5142Ω
10VDC	R_{adj}=30000/ V_{in} (V)	V_{in}=6V R_{adj}=5000Ω

The best to suit your needs!



PQA700

PQA700 is a complete power quality analyzer suitable to check the electrical phenomena according to what is required by the EN50160 Standard (Harmonics, Supply voltage dips, Supply voltage variations and Supply interruptions). The basic features are particularly interesting because they include: a display which, thanks to its shape, shows the information clearly and neatly; a built-in impact dot matrix printer for printing the measurement results manually and automatically; a rechargeable battery to allow the user to take measurements even under tough disturbances and special power supply conditions; an RS232 communication port to download and process the measurements adequately and last but not least an easy and intuitive operating mode.

- Base accuracy 0.5% RDG (current, voltage)
- Measurement of single phase and system variables: V, A, W, VA, var, TPF, DPF, Hz, Wh, varh-L, varh-C, VAh
- Complete Harmonic analysis up to the 50th harmonic
- 20ms continuous signal sampling
- Automatic storage of MIN, MAX and AVG values
- Time-based curve distribution of variable and load
- Statistic management of stored variables
- Oscilloscope functions
- Built-in printer
- RS232 port
- Rechargeable battery
- Complete accessory set
- Carrying case
- Analysis software

All this is supplied together with a rich equipment of accessories including a set of three accurate clamp-on probes which allows to take measurements up to 1200A (with two selectable full scales: 100A or 1000A) a complete set of cables, an analysis software. On request a 3000A flex clamp probe is available (model: Flex3000Q). And finally a modern and rugged carrying case. The compact dimensions, the rugged construction, the shape and the reduced weight of the instrument simplify its use and its location under any condition of installation.

Starting from 1994 with the publication of the EN50160 Standard by CENELEC, the idea of quality of the electric service has been introduced and made executive for the public electrical network at low and medium voltage. This event underlines, for the first time, the necessity to introduce some measuring parameters of the electric product, with the indication of its basic features and the limits within which it is considered as a quality product. The items featuring the service/product in the origin of the installation are the following: its waveform, its frequency, its magnitude and symmetry (in a three-phase system); the relevant conditions are: normal use and emergency use.

It is clear that the characteristics of the electric product not only depend on the skill of the supplier in the electrical network management, but also on how the electric product is used. The improvement in the quality of the electric service obviously implies a cost both for the supplier and for the user. The supplier's costs can be summed up in the updating, extension and development of the electrical network; the user's costs: any necessary disturbance compensation, any necessary subordinate electric connection, any possible payment of penalties due to a low power factor or to the overcoming of the limits of power demand. Some additional costs can be even higher and unforeseeable, such as those due to failures of the loads and to the subsequent unplanned maintenance of the machines and of the installations merely due to electric problems.

Electrical phenomena

If we briefly go back to the characteristics of electric voltage in the origin of the installation and in order to closely examine this matter, the Regulation divides these features into two groups;

The first one for which some quantitative information are supplied:

- Frequency
- Harmonic distortion
- Phase Asymmetry

The second one for which a few approximate data are supplied:

- Quick voltage variations
- Voltage dips
- Supply interruptions
- Overvoltages

All these variables have a direct consequence on the service quality, but also on lines and loads.

The problems

The direct consequences of these phenomena on lines and loads can be underlined as follows:

- Failures on compensation capacitors
- Blowing of capacitor fuses
- Overheating of power supply transformers with load current below the rated value
- Overheating of motors and frequent failures
- High neutral conductor currents
- Problems on electronic motor controls
- Frequent activation of UPS.

The Main Menu

The selection menu of the measuring functions is immediately available by means of a keypad command and allows the operator to:

- Display the instantaneous measurements
- Display the energies
- Enable the oscilloscope function
- Enable the harmonic analysis
- Enable the recording of supply voltage dips
- Enable the MIN / AVG/ MAX recording
- Set the clock
- Program the basic parameters of the instrument

The solution

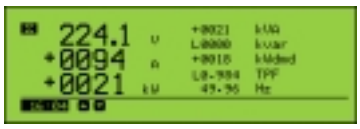
In this case the solution to the monitoring of these electric variables can have two different proposals depending on the application needs:

- The first one refers to the occasional analysis and monitoring of the lines and of some critical charges by means of the right instrument, such as PQA700. This analyzer represents therefore the solution according to what is required by EN50160.
- The second and more complete proposal refers to the continuous monitoring and to the automatic recording of various conditions; these are due either to basic phenomena such as the harmonic contents of currents and voltages or to the measurements connected to consumption (current, power, energy, etc.). The latter can be taken with a flush-mounting instrument, like WM3-96, and can be followed by the subsequent research and location of the anomalies by means of a proper measuring and analysis instrument such as PQA700.

How to order PQA700

PQA70[Clamp type: 2= CA1002, 3X= Flex 3000Q] [Language: I, E, F, D, UK][Power Supply: 115V, 230V]
See next page: “Accessories”.

e.g.: PQA702 UK 230V
PQA702 D 230V
PQA703X UK 115V



The instantaneous variables are displayed clearly and neatly; moreover they are displayed with characters at various heights, according to their importance, and they are grouped per page, by system variables and phase variables so that they can be easily compared among them.

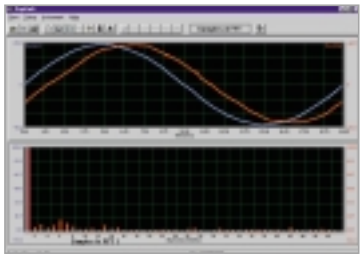
Particular attention has been given to the way of displaying the variables: in case of TPF and DPF the values of each phase are displayed together with the FRESNEL diagram.

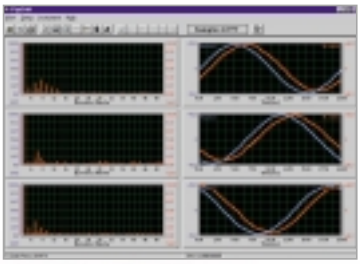
The energies are displayed: by consumed and exported active, reactive and apparent energy and by time period.

The behaviour of the current and voltage variables is displayed comparing the relevant waveforms for each phase. Moreover, also the main instantaneous variables are displayed in a numeric form: V-A-TPF-Hz.

The FFT analysis displays the harmonic content in various pages: by phase, current and voltage. A pointer allows the operator to display for each harmonic the percentage value, the absolute value as a current or voltage and the corresponding harmonic order.

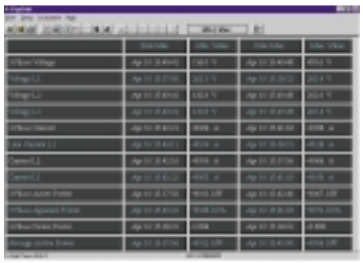
PqaSoft This Windows 95/ 98/ 2000/ XP based software allows the user to download all the data acquired by PQA700 during the measuring phase. PqaSoft allows the user, by means of icon buttons, to display simply and intuitively the data stored in the memory of the instrument; it also allows a graph processing of current and voltage (oscilloscope function) and the displaying of histograms relating to the FFT (harmonic analysis). Other available functions are: management of energy meters by time periods, export of the data acquired as TXT format files readable by different Windows programs, possibility of instrument configuration from the PqaSoft, data logging of up to 20 variables in TXT format files directly on the hard disk of the PC. All the PqaSoft functions are available connecting PQA700 and the PC directly. Furthemore PQA700 allows the user to download the stored data and to program it by analogue modem.



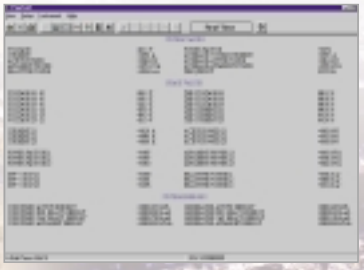


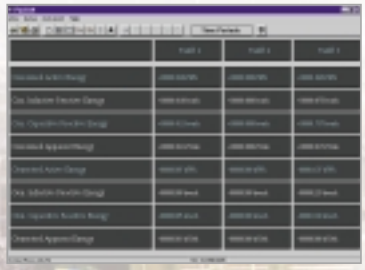
Display of current and voltage for each phase with indication of the harmonic contents.

Display of MIN and MAX values with time reference to the phase voltage and current, to the active and apparent power, to the system power factor together with the average power.



Real time display of the main variables.





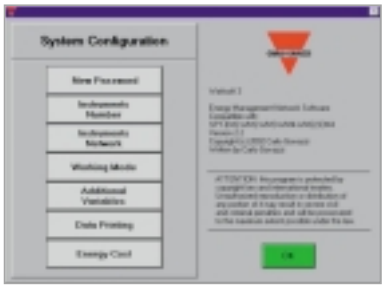
Display of all the energies with reference to the consumed and to the exported energies.

Portable Power Quality Analyzer PQA700 MAIN FEATURES

Display	Type: Graph, 240 x 64 dots (back lighted) Refresh time:500ms
Display language	Selectable: English, Italian, Spanish, German, French
Other indications	Battery recharging by means of a red LED
Accuracy	0.5% RDG + 0.15% F.S. (5 to 120% of the voltage range, resolution: 0.1V), 45 to 65Hz 0.5% RDG + 0.15% F.S. (5 to 120% of the current range), minimum measurable current: 1A (1mV) , 45 to 65Hz 0.05% RDG (frequency). 1% RDG all the other measurements
Sampling frequency	6400Hz @ 50Hz
Sampling time	For instantaneous variables: 20ms / continuous. For dips: 10ms
Measuring inputs	Voltage measurements: 4 (non-insulated), max. 700V_{LL} RMS. Max peak value: 1600Vp for 1s Current measurements: 3 (non-insulated, the insulation is achieved by the clamp-on probes) max. 1.4VAC equivalent to 1400A
Type of connections	1-phase, 3-phase balanced load, 3-phase unbalanced load, ARON type
Measuring method	TRMS type, crest factor ≤ 3
Available measurements	Instantaneous single and system variables: W, VA, var, V, A, TPF, DPF, Hz, THD (voltage, current), odd THD, even THD Maximum demand calculation: W, VA, A (system variables), calculation period: programmable from 1 to 60 minutes. Automatic calculation of kvar necessary to compensate low PF FRESNEL diagram indication Maximum and minimum calculations (single phase and system variables): W, VA, var, V, A, DPF, TPF, Hz, THD (THD is considered for both current and voltage), odd THD, even THD. Energies: + Wh, - Wh, + varh, - varh, +VAh, -VAh (also by time period). FFT analysis (harmonic distortion): histogram indication up to the 50th harmonic, numerical and percentage indication of harmonic contents, of both voltage and current. THD (total, odd, even) and single harmonic measurement. FFT voltage range: 2 to 100% F.S.; FFT current range: 5 to 100% F.S. THD calculation according to EN61000-4-7
Data recording	Type: FIFO or stack Start measuring delay: programmable from 00:00h to 23:59h Data integration time interval (10ms sampling) : programmable from 1 to 999s (15 min.) Type of recording: minimum, maximum and average value or voltage DIPS Data references: date and time (hh:mm:ss) Total available memory: 1Mbyte
Archives function (by means of PqaSoft)	Type: stack. Measuring period: fully programmble. Data sampling time: programmable from 10 to 999 s. Type of recording: data sampling of up to 20 selectable variables. Data references: date and time (hh:mm:ss)
Other functions (by means of PqaSoft)	Statistic management of the stored variables Time-based curve distribution of variables and loads
Oscilloscope function	Current and voltage (current and voltage of single phase available in the same display page) with automatic trigger
Measurements according to EN50160	Supply voltage dips, slow and fast supply voltage variations, supply interruptions
Outputs (insulated)	RS232: 9-pole connector, programmable baud rate up to 38400
Printer	Impact dot matrix type, paper width: 54mm (numerical and graph data printing)
Power supply	230VAC ±15% (115VAC ±15% on request) and internal rechargeable battery power supply (battery life: 1h)
Approvals	CE
Installation Category	III / 600V (according to EN61010-1), double insulation
EMC	EN61000-4-2 discharge: 8kV “air” level 3, 4kV “contact” level 2; EN61000-4-3 radiated field: 10V/m level 3; EN61000-4-4 transients: 2kV level 3; EN61000-4-5 surge: 2kV; EN50011 conducted emission, class A
Operating temperature	0 to 55°C (R.H. < 90% non-condensing)
Storage temperature	-10 to 60°C (R.H. < 90% non-condensing)
Carrying case / weight	160 x 340 x 510mm / Instrument: 3.7Kg, the whole set: 10Kg
Standard accessories	4 voltage measuring cables, length 3m 1 RS232 cable 1 power supply cable 1 analysis software (PqaSoft) 1 instruction manual (English, Italian, Spanish, German or French) CA 1002: current clamp probe 100-1000AAC, jaw opening 52mm, cable length 2m accuracy: 0.7% @ 100A, 0.5% @ 1000A
Accessories on request	Flex3000Q: current clamp probe 3000AAC, flexible type, sensor length 400mm, measuring range: 0,5A to 3000A, cable length 2m; accuracy: 1.5% @ 150A, 0.75% @ 1600A, 0.5% @ 3000A

Energy Management Software

WattSoft2 and WattSoft3 combined with our hardware, are the most updated answer to all the power and energy parameters control needs. WattSoft3 is able to figure-out two basic problems: the management of up to 255 energy meters or power analyzers by means of a MODBUS (RS485) linking system; the supervision and control of all the electrical variables being measured in order to optimize the energy consumption and therefore to save money. WattSoft2 is a lighter software package addressed to those applications where a limited network (up to 12 instruments) is installed.



The set-up menus

WattSoft can be configured according to the particular needs required by the monitored network. Different variables from different instruments can be controlled setting the alarms; additional monitored variables can be added to the default ones; automatic data printing can be enabled. All the parameters of the contract can be implemented for a full energy cost management (single or dual tariff).

Instantaneous variables

All the instantaneous (basic plus additional) variables of all the instruments are displayed in numerical format with a visual indication of the active alarms and a useful hour meter function for cost management or maintenance planning purposes. The alarms are logged in a dedicated and printable page.

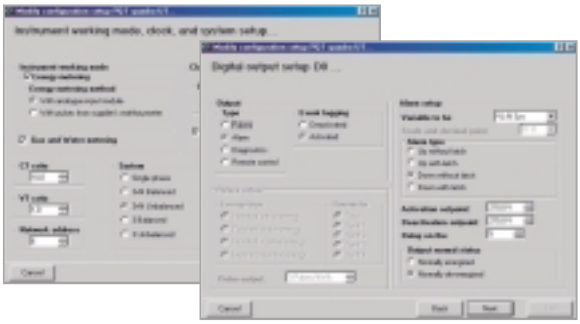
The graphs

The instantaneous variables are available in a graphical format. Furthermore the demanded power (Wdmd) trend can be also shown as a histogram with different colours according to the current tariff. A powerful set of tools is available for a detailed analysis of the stored information.

Simplified working mode

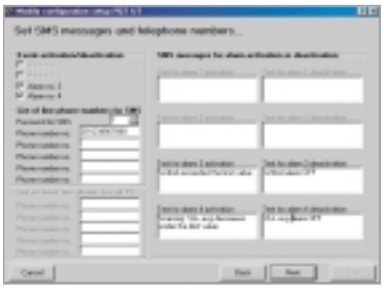
A limited set of variables is shown for 18 instruments by page. The ON/OFF switch allows to enable or disable the load, resetting the energy values and printing a simplified “energy bill” relevant to the selected user.

Wm4Soft and PqtSoft Remote allow in a very intuitive and fully guided way to configure the instrument, to choose the SMS alarms and to select the 8 variables to be logged in the 2Mb memory. A real-time table showing all the variables is available too. The PC where the software runs can be connected to the instrument by RS232, RS485 (also multi-drop), analogue or GSM modems.



Instrument configuration

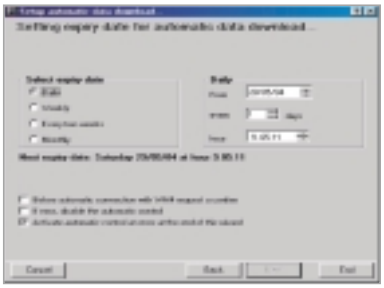
All the working parameters of the instrument can be uploaded according to its module composition and to the system to be monitored. A configuration archive is available in order to store different situations and it is possible to download the current configuration in order to modify it.



SMS setting

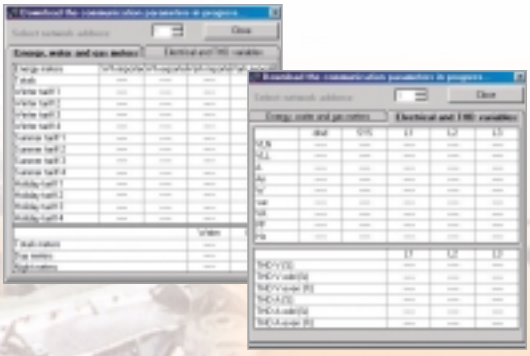
Up to 8 different SMS can be sent from the instrument in case of alarm activation or deactivation to up to 5 phone numbers.

Wm4Soft and PqtSoft Network allow the manual or automatic data download from the 2Mb memory module inserted in the instrument and the selection of the alarm SMS. A real-time table showing all the variables is available too.
The PC where the software runs can be connected to the instrument by RS232, RS485 (also multi-drop), analogue or GSM modems.
A phone book is available to call up to 100 instruments allocated in different places.



Data download

It is possible to manually or automatically download the logged data from up to 100 remote networks composed by maximum 10 WM4 96 or 255 PQT 90 each. The time period between two consecutive automatic downloads is fully configurable from 1 day to 1 month. The downloaded data are available for the users in a TXT format so to be used in an Excel spread-sheet for a full analysis .



Real-time variables

The real-time function allows the display of all the instantaneous variables measured by the instrument and of the total and partial energy, gas and water .

Accessories

Types	SIU-PC85	SIU-DIN 8585	SIU-DIN.RLY	PSU-DIN (DC/AC)	PSU-DIN (AC/DC)
Description	Serial communication line adapter	Serial communication line amplifier, driver	Serial communication relay outputs	Power supply unit DC to AC	Power supply unit AC to DC
Housing	Front: 65x80mm	Front: 89x71.5mm	Front: 89x71.5mm	Front: 89x71.5mm	Front: 89x71.5mm
Signal input	RS232	RS485, RS422	RS485, RS422	N.A.	N.A.
Working mode	2-wire comm.	2 or 4-wire comm.	2 or 4-wire comm.	N.A.	N.A.
Line Bias	N.A.	YES	N.A.	N.A.	N.A.
Line termination	N.A.	YES	YES	N.A.	N.A.
Connections	9-pole, female	Screw terminal block	Screw terminal block	Screw terminal block	Screw terminal block
Output	RS422 RS485	RS422	4 relays 5A, 250V	24VDC (max. 250mA) 48VDC (max. 125mA) 115VDC (max. 50mA)	5VDC (max. 200mA) 12VDC (max. 100mA) 24VDC (max. 50mA)
Working mode	4-wire comm.	4-wire comm.	SPDT contacts	Switching mode	By transformer
Line Bias	YES	YES	N.A.	N.A.	N.A.
Line termination	YES	YES	N.A.	N.A.	N.A.
Connections	Screw terminal block	Screw terminal block	Screw terminal block	Screw terminal block	Screw terminal block
Baud rate	Max 19200 Baud	Max 19200 Baud	Max 9600 Baud	N.A.	N.A.
Protection	All inputs/outputs	All inputs/outputs	N.A.	Output: by fuse	Output: electronic
Indication (by means of LEDs)	Power-on Data-stream	Power-on	Power-on Comm. status Output status	Power-on	Power-on
Insulation	Input/output: 2kV input/output and power supply: 4kV	Input/output: N.A. input/output and power supply: 4kV	Input/output: 2kV input/output and power supply: 4kV	N.A.	Input/output: 4kV
Operating temperature	0 to +50°C (R.H. ≤90% non condensing)	0 to +50°C (R.H. ≤90% non condensing)	0 to +50°C (R.H. ≤90% non condensing)	0 to +50°C (R.H. ≤90% non condensing)	0 to +50°C (R.H. ≤90% non condensing)
Storage temperature	-10 to +60°C (R.H. ≤90% non condensing)	-10 to +60°C (R.H. ≤90% non condensing)	-10 to +60°C (R.H. ≤90% non condensing)	-10 to +60°C (R.H. ≤90% non condensing)	-10 to +60°C (R.H. ≤90% non condensing)
Included set	1.8m cable with 9 to 9-pole connectors, power supply cable	N.A.	N.A.	N.A.	N.A.
Other characteristics	Wrong-line connection and full overvoltage protection. Reverse conversion capability.	Dual purpose: distance increase by 1200m per unit; network increase	4 relay outputs to be driven by an RS485 communication port	Stabilised AC voltage output. Stability: ≤4% Un @ max. current	Stabilised DC voltage output. Stability: ≤0.5% Un @ max. current Non-stabilised DC voltage outputs: 2V-20V-30VDC
Power supply input	24VAC, 48VAC 115VAC, 230VAC	24VAC, 48VAC 115VAC, 230VAC	24VAC, 48VAC 115VAC, 230VAC	80 to 240VDC 18 to 60VDC 9 to 16VDC	24VAC, 48VAC 115VAC, 230VAC
Approvals	CE	CE	CE	CE	CE
Protection degree	IP20	IP40	IP40	IP40	IP40

Split Core Current Transformer

Types	SCT74/30	SCT104/50	SCT140/80
Class	1/ 3/ 0.5 (on request)	1/ 3/ 0.5 (on request)	1/ 3/ 0.5 (on request)
Bus–bar size	31 x 26mm	51 x 51mm	81 x 51mm
Dimensions (HxWxD)	100 x 61 x 74 mm	128 x 56 x 104 mm	155 x 53 x 140 mm
Standards	BS3938, EN60044-1, DIN42600	BS3938, EN60044-1, DIN42600	BS3938, EN60044-1, DIN42600
Primary current	Burden (VA)	Burden (VA)	Burden (VA)

Class	0.5	1	3
100 A	-	-	1.5
125 A	-	1.5	-
150 A	-	-	2.5
200 A	-	1.5	5
250 A	-	1.5	5
300 A	-	1.5	7.5
400 A	1.5	5	10

Class	0.5	1	3
150 A	-	-	1.5
200 A	-	1.5	-
250 A	-	1.5	3.75
300 A	-	1.5	5
400 A	1.5	2.5	5
500 A	2.5	5	10
600 A	2.5	5/7.5	15
750 A	3.75	5/7.5	-
800 A	5	5/10	15
1000A	5/10	5/10	10

E.g.: 5/10 — 5= standard, 10= on request

Class	0.5	1	3
400 A	-	-	5
500 A	-	2.5	5
600 A	1.5	3.75	7.5
750 A	2.5	5/7.5	10
800 A	3.75	5/7.5	10
1000A	5	5	20
1200A	5/10	5/10/15	20
1250A	5/10	5/10/15	20
1500A	5/10/15	10/15/20	30
1600A	5/10/15	5/10/15/20	30

E.g.: 5/10 — 5= standard, 10= on request

Types	SCT166/125	SCT166/165	SCT166/205
Class	1/ 3/ 0.5 (on request)	1/ 3/ 0.5 (on request)	1/ 3/ 0.5 (on request)
Bus–bar size	62 x 127mm	62 x 167mm	62 x 205mm
Dimensions (HxWxD)	248 x 50 x 166 mm	288 x 50 x 166 mm	328 x 50 x 166 mm
Standards	BS3938, EN60044-1, DIN42600	BS3938, EN60044-1, DIN42600	BS3938, EN60044-1, DIN42600
Primary current	Burden (VA)	Burden (VA)	Burden (VA)

Class	0.5	1	3
500 A	-	2.5	5
600 A	-	2.5	5/7.5
800 A	1.5	5	10
1000A	2.5	5/10	15
1200A	5	5/10/15	20
1250A	5	5/10/15	20
1500A	5/10	5/10/15	20
1600A	5/10	5/10/15	20
2000A	5/10/15	5/10/15/20	-
2500A	5/10/15/20	5/10/15/30	-
3000A	5/10/15/30	5/10/15/30	-

E.g.: 5/10 — 5= standard, 10= on request

Class	0.5	1	3
800 A	-	5	7.5
1000A	-	5/7.5	10
1250A	1.5	5/10	15
1500A	2.5	5/10/15	20
1600A	5	5/10/15	30
2000A	5/10/15	5/10/15/20	30
2500A	-	5/10/15/20	30
3000A	5/10/15/30	5/10/15/30	-
4000A	5/10/15/30	5/10/15/30	-

E.g.: 5/10 — 5= standard, 10= on request

Class	0.5	1	3
1000A	-	5	7.5
1200A	1.5	5/7.5	10
1250A	1.5	1.5/2.5/10	5/15
1500A	2.5	5/10	15
2000A	5	5/10/15	20
2500A	5	5/10/15	20
3000A	5/10/15	5/10/15/20	30
4000A	5/10/15	5/10/15/20	30
5000A	5/10/15/30	5/10/15/30	-
6000A	5/10/15/30	5/10/15/30	-

E.g.: 5/10 — 5= standard, 10= on request

Note: all the products are CE approved.

Current Transformer

Types	TADK	TADK2	TAD 2	TAD 3	TAD 4
Class	0.5	0.5	0.5/ 1/ 3	0.5/ 1	0.5/1
Bus–bar size		25x5 mm	20x8 mm	21x14 or 31x11 mm	32x16 or 41x11 mm
Dimensions (H x W x D)	115.5x75x44 mm	115.5x75x44 mm	98.5x58x44 mm	98.5x58x44 mm	75x115.5x44 mm
Standards	IEC 60185/EN 60185	IEC 60185/EN 60185	IEC 60185/EN 60185	IEC 60185/EN 60185	IEC 60185/EN 60185
Accuracy class depending on the burden output	Class 0.5 Burden VA	Class 0.5 Burden VA	Class 0.5 1 3 Burden VA VA VA	Class 0.5 1 Burden VA VA	Class 0.5 1 Burden VA VA
Primary current at rated output current of 1A/5A	1 A 10 5 A 10 10 A 10 15 A 10 25 A 10 40 A 10	1 A 10 5 A 10 10 A 10 15 A 10 25 A 10 40 A 10 50 A 10 60 A 10 80 A 10 100 A 10 150 A 10 200 A 10 250 A 10	40 A 3 50 A 3 60 A 3 80 A 3 100 A 3 4 150 A 3 4 6 200 A 3 4 6 250 A 5 8 10 300 A 5 8 10	100 A 3 150 A 3 4 200 A 3 4 250 A 5 8 300 A 5 8 400 A 6 10 500 A 6 10 600 A 6 10	100 A 3 150 A 3 200 A 4 250 A 6 300 A 6 400 A 10 500 A 10 600 A 10 800 A 10

Types	TAD 6	TAD 8	TAD 12	TACO 110	TACO 200
Class	0.5/1	0.5/1/5P10	0.5/1/5P10	0.5/1/5P10	0.5/1/5P10
Bus–bar size	55x24 or 65x20 mm	82x32 or 65x34 mm	127x51 or 102x53 mm	Max 110 mm	Max 200 mm
Dimensions (H x W x D)	105x145x44 mm	140x120x55 mm	183x170x65 mm	183x170x 65 mm	295x280x45 mm
Standards	IEC 60185/EN 60185	IEC 60185/EN 60185	IEC 60185/EN 60185	IEC 60185/EN 60185	IEC 60185/EN 60185
Accuracy class depending on the burden output	Class 0.5 1 Burden VA VA	Class 0.5 1 5P10 Burden VA VA VA	Class 0.5 1 5P10 Burden VA VA VA	Class 0.5 1 5P10 Burden VA VA VA	Class 0.5 1 5P10 Burden VA VA VA
Primary current at rated output current of 1A/5A	400 A 6 12 500 A 6 12 600 A 10 20 800 A 10 20 1000A 20 40 1200A 20 40 1500A 30 60 2000A 30 60	400 A 4 8 5 500 A 6 12 5 600 A 10 20 5 800 A 15 30 5 1000A 20 40 5 1200A 30 50 5 1500A 40 60 5 2000A 50 80 5 2500A 60 100 5	800 A 15 30 10 1000A 20 40 10 1200A 30 60 10 1500A 40 80 10 2000A 50 100 10 2500A 60 120 10 3000A 80 160 10 4000A 100 200 10	800 A 15 30 10 1000A 20 40 10 1500A 40 80 10 2000A 50 100 10 2500A 60 120 10 3000A 80 160 10 4000A 100 200 10	1000A 15 30 10 1500A 15 30 10 2000A 15 30 10 2500A 40 80 10 3000A 40 80 10 4000A 50 100 10 5000A 50 100 10 6000A 50 100 10

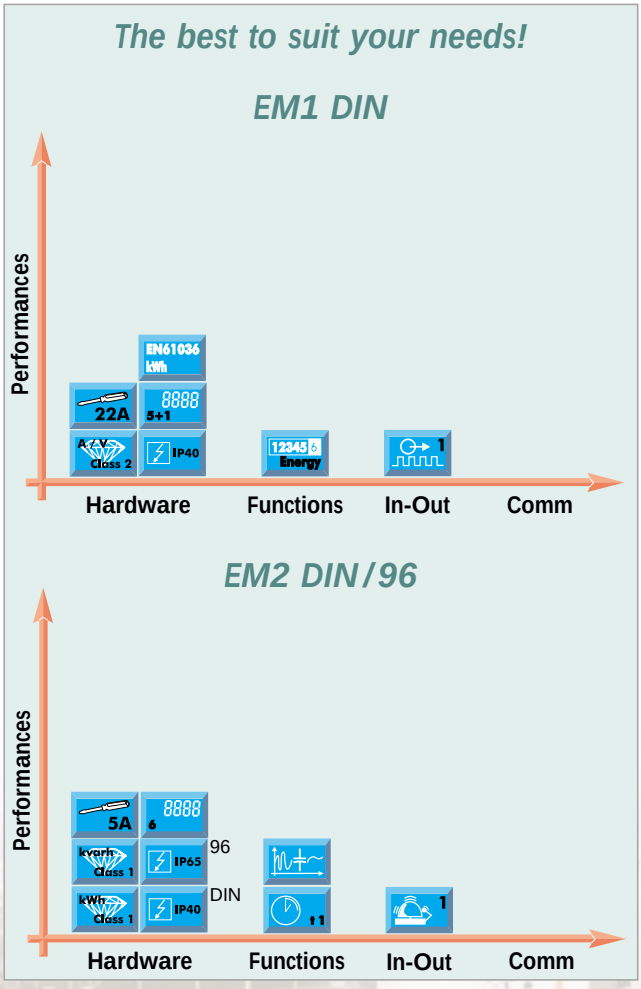
Cable/Bus–bar type current transformers. Standard output 5A (1A on request). Rated primary currents from 40A to 6000A. DIN–rail or panel mounting. Current transformer 1-phase AC; operating frequency: 40 to 60 Hz; max system voltage: 0.72 kV; rated insulation level: 3kV/1min @ 50Hz; security factor: ≤5; rated secondary current: 5A standard (1A on request). All the products are CE approved.

EM1/EM2 DIN EM2 96

EM1 DIN, EM2 DIN, EM2 96, are energy meters suitable to measure the consumed energy in various services and light/medium industries. These instruments are normally connected downstream the official watthours meter to measure the energy consumed by machines or departments, in order to split the costs accordingly.
EM1 DIN is the electromechanical space-saving solution: in only 2-DIN module housing there is a reliable active energy meter with optional pulse output.

EM2 96 and EM2 DIN display the total and partial active and reactive energy.

Energy Meters	EM1 DIN	EM2 DIN/96
Housing (H x W)	89x35mm	89x107/96x96mm
Display type	Mechanical	LCD back lighted
Variables on display	YES	YES
Instantaneous variables	N.A	N.A.
Energy variables	5+1 DGT (0.1kW)	6 DGT
Accuracy	Class 2 (EN6036)	Class 1
Temperature drift	≤200ppm/°C	≤200ppm/°C
Sample/s	2	3
System type	1-phase	Bal: 1-3-phase Unbal: 3-phase
Voltage inputs (Un)	230VAC	250/433VAC
Current inputs (In)	Ib:15A, Imax: 22.5AAC	5AAC
Digital inputs	N.A.	N.A.
Primary of CT/VT	N.A.	CT: progr. up to 5000A
Measurements: **Variables**	TRMS method kWh	TRMS method Total: kWh, kvarh Partial: kWh, kvarh
Harmonic distortion	N.A.	N.A.
Outputs: **Pulse**	1 (open collector)	N.A.
Alarm	N.A.	Driven by RS485
Analogue	N.A.	N.A.
Serial	N.A.	N.A.
Digital filter (action)	N.A.	N.A.
Other characteristics	Start up current 50mAAC	Only EM2 96: modular concept, plug-in modules DC power supply
Power supply	Self power supply	24, 48,115, 230VAC 96 only: 18 to 60, 90 to 260VAC/DC
Approvals	CE	CE, -cURus, CSA (96)-
Protection degree	IP40	IP40 (DIN) IP65 (96)



Accuracy of the main variables

Standard-compliant energy metering

Housing front protection degree

Max measured current in case of direct connection

Digit number of display

Harmonic analysis

Asymmetry control

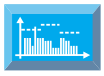
Max and/or minimum signal detection and storage

Data logging

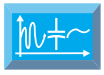
Internal clock

Energy metering by time period

Load profile displaying and recording



Digital filter with action on display and signals output



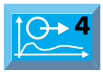
Energy, gas, water metering

Instantaneous variables metering

Digital inputs for gas/water metering or Wdmd synchro

Pulse outputs for energy retransmission

Analogue outputs for variable retrans-mission



Alarm outputs for variable control

Communication port

Management of external analogue modem

Management of external GSM modem and SMS messages

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